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AMERICAN ORIBATID MITES OF THE SUBFAMILY GALUMNINAE.

By Arthur Paul Jacot
(Shantung Christian University)

With Six Plates.

CAMBRIDGE, MASS., U. S. A.:
PRINTED FOR THE MUSEUM.
January, 1929

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No. 1.— *American Oribatid Mites of the Subfamily Galumninae.*

By Arthur Paul Jacot

(Shantung Christian University)

The species of this group have heretofore been placed under generic names in a rather arbitrary way and with no apparent concept of their phylogenic relations. This is rendered doubly evident when one considers the characterization of such genera as *Stictozetes* (see below).

The following genera belonging to this subfamily have been in use:

Galumna Heyden 1826, p. 612; type: *Notaspis alatus* Hermann 1804, p. 92, pl. 4, fig. 6. Strasbourg, in moss. Hermann's description includes generic characters only. His figure gives one character of subgeneric importance, namely, the long tactile (major) bristles of the hind (as well as fore) legs. This is a characteristic of those species which have no abdomino-cephaloprothoracic suture. One may, out of respect to the author, construe the absence of such a suture in the figure as further evidence that Hermann's species belongs to this group. If now, one compares Hermann's figure with those of Oudemans in his revision of this group (1919), one finds that it resembles most the figures of *G. alatum* by reason of its rather elongate shape and the prominence of the indentation of the sides of the cephaloprothorax at the base of the rostrum. It also comes very close to *G. longiplumum*, in which, though the outline does not resemble it as well, the shape of the camerostome resembles it more. This, however, is offset by the fact that it lacks the long tactile (major) bristle on the second and third pairs of legs. Thus it would seem that Oudemans' reidentification of this species is correct, at least as nearly as Hermann's figure will allow and, until further light can be thrown on the question, I must accept Oudemans' identification and consider his figures and description of *G. alatum* as correctly representing the type of this genus.

The name is undoubtedly taken from the Latin noun *galumma, atis,* a cover, but Heyden's spelling, not having been corrected (nor its derivation noted) by himself, must be retained. This Latin word is probably from the Greek *kalumma, atos* (neuter), a covering, as head cover, eyelid, fruit shell, etc. It is a *neuter* noun.

Zetes Koch 1842; type: *Z. climatus* Koch (1841, fasc. 31: 5) 1842, pl. 11, fig. 55. Bayern, in moss in woods, in moist meadows and shady places. Koch states, in the last paragraph of the foreword to the third volume of the *Übersicht,* that he has given with each genus a *figured* species to serve as type. Thus the first species listed after the generic description is *not* (as some writers have inferred) the type.

The type species is fairly well described by Koch and twice figured by him. The figure of 1841 disagrees strikingly with the type figure of 1842 in that it has long interlamellar hairs which are entirely absent in the type figure. The description bears out the type figure, for it states that there are two pairs of cephaloprothoracic hairs and not three pairs. If any pair is lacking in this group, it is always the interlamellar pair that is lost first. Thus, as both the description and the type figure agree in this important character, one must discard the earlier illustration as that of another (a fourth) species. As Berlese seems to have put complete faith in this first illustration, without carefully studying the description or type figure, his understanding of Koch's genotype is incorrect. Thus *G. obvius,* as described and figured by Berlese and later by Oudemans, is *Z. climatus* Koch and the genotype of *Zetes.*

As the genus *Galumna* (as previously used) divides naturally into two groups, one consisting of large species with well-defined abdomino-cephaloprothoracic suture, long tactile (major) bristles on fore legs only and moderately fusiform pseudostigmatic organs, typified by *Z. climatus;* the other consisting of small species without or with partly defined abdomino-cephaloprothoracic suture, major bristles on at least one of the pairs of hind legs and pseudostigmatic organs which are usually filiform or strikingly thickened at tip, typified by *G. alatum,* I propose to employ Koch's name *Zetes* as a distinct genus for the reception of these less highly specialized forms and retain Heyden's name *Galumna* as a genus which would include those forms whose greater specialization is marked by the complete fusion of the cephaloprothorax with the abdomen, the greater leg sensitization as expressed by the greater number of major bristles of the legs, and the more highly specialized pseudostigmatic organs. This arrangement gives the following synonymy:

Zetes climatus (Koch)

1841 *Oribates climatus* C. L. Koch, fasc. 31: 5 (non fig. 5).
1842 *Zetes climatus* [1] C. L. Koch, p. 99, pl. 11, fig. 55.

[1] I am in favor of adopting this emendation as it is quite evident that e was meant, the c being easily mistaken for an e in proofreading and, as Oudemans says, *climatus* is not Latin while *elimatus* is Latin for polished (a specific character).

1913 *Galumna climatus* Oudemans, p. 29 (adultus)–30, pl. 17, figs. 4–10.
1914 *Oribates obvius* Berlese, p. 119, pl. 1, fig. 1.
1919 *Galumna obvius* Oudemans, p. 42, figs. 3–5.

Galumna alatum (Hermann)

1804 *Notaspis alatus* Hermann, p. 92, pl. 4, fig. 6.
1826 *Galumna alata* Heyden, p. 611.
1913 *Galumna alatus* Oudemans, p. 31.
1919 *Galumna alatus* Oudemans, p. 59, figs. 6–13.

N.B. I omit all doubtful references or references to general works, compendiums, etc. as irrelevant.

Zetes (one of the argonauts) is a masculine noun.

Centroribates Berlese 1914, p. 122; type: *Oribata mucronata* G. & R. Canestrini 1882, p. 4, pl. 2, fig. 2 (Oudemans 1919, p. 80, figs. 108–114). In moss, Italy.

Neoribates Berlese 1914, p. 127; type: *Oribates roubali* Berl. 1910, p. 385; 1914, p. 128, pl. 2, fig. 20. Bohemia. Anyone having made a comparative study of the structural characters of the species placed under the term *Neoribates* will have been struck with their heterogeneity. The genotype resembles *Zetes* in having lamellae so reduced as to appear closely appressed to surface of cephaloprothorax and barely forming a very slight ridge when viewed from above. It differs in lacking emarginate and grooved pteromorphae and well-developed areae porosae. Thus *Zetes* has specialized beyond it. Its closest ally is our *N. quadrisetosa* (see below).

Such species as *N. depressa*, *N. pterota*, *N. aurantiaca*, *N. oceanica* and *N. fissurata* differ markedly by their less reduced and quite evident lamellae. They are also smaller. These may be grouped under the name:

Protokalumma gen. nov.

Species of the old genus *Neoribates*, having lamellae developed as narrow blades which project as keels from sides of cephaloprothorax, especially at their distal end, and not forming a band, appressed to cephaloprothorax as in the genus *Galumna;* and with anteriorly rounded pteromorphae.

Type:— *Oribata depressa* Banks 1895, p. 7.

Differing from these but in another direction, are the large species *Galumna robusta* Banks (see below) and *N. lydia* Jacot (see below). Though closest to *Protokalumma* they differ from all other members of

the family in having the anterior edge of the pteromorphae more or less emarginate and therefore pointed. They may be grouped under the name:

PARAKALUMMA gen. nov.

Species of the old genus *Neoribates*, having lamellae developed as narrow blades which project as keels from sides of cephaloprothorax, especially at their distal end, and whose pteromorphae are emarginate or retuse in *front* so as to leave a single acute angle on anterior edge and not smoothly rounded as in the genus *Galumna*.

Type:— *Neoribates lydia* Jacot 1923, p. 169.

SANDENIA Oudemans 1919, p. 74; type: *Galumna georgiae* Oud. 1913, p. 36; 1919, figs. 100–107. Under stones, South Georgia.

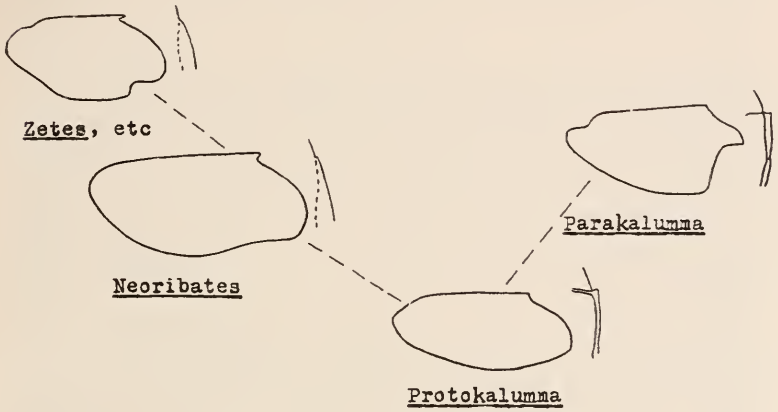
KRATZENSTEINIA Oudemans 1919, p. 79; type: *Oribata rugifrons* Stoll 1891, p. 25, pl. 15, fig. 2. Belize, British Honduras. Being based on surface sculpture, this group cannot be considered of more than *subgeneric* rank. As the abdomino-cephaloprothoracic suture is distinct, it falls under *Zetes*.

VAGHIA Oudemans 1919, p. 79; type: *Oribates* (*Stictozetes?*) *stupendus* Berl. 1916, p. 305. In humus, Tiarno, Tridentino, Italy. Like the preceding, this group is also based on surface sculpture. As the abdomino-cephaloprothoracic suture has partially disappeared, the group falls under *Galumna*. Berlese's interrogation point after the subgeneric name is eloquent testimony of the worthlessness of this group of his.

STICTOZETES Berlese 1916, p. 57; type: *Oribates* (*St.*) *scaber* Berl. 1916, p. 57; subgenus of *Galumna*. The description of this subgenus in Latin reads: "Whole skin roughened with very small punctures, even on pteromorphae. (It seems to me that there is a somewhat punctulate, hyaline, very fine pellicule covering the whole animal, very tenaciously adhering to the (shining?) skin. Otherwise as in the genus *Oribates* (s. str.)." The type species belongs to the genus *Galumna*, sensu restrictu. As Berlese's one character, granulation of surface, is one which is entirely superficial (as he himself states) and appears without any phylogenic sequence but as a mutation liable to occur in any species, the character is merely specific and cannot be recognized as a valid group division.

Of these groups, *Protokalumma* is most primitive because of the lack of reduction of lamellae and lack of emargination of the pteromorphae. From this group spring two diverging branches, namely: *Parakalumma* which still retains the lamellae but whose pteromorphae are emarginate

on *anterior* border, and *Neoribates-Galumna* whose lamellae have become reduced to appressed plates, barely to not at all projecting from surface of cephaloprothorax. Their pteromorphae, however, show two stages of development. In *Neoribates* they are sinuous along ventral edge and have no median groove, while in *Zetes-Galumna* they are distinctly emarginate and have the groove (a structure which undoubtedly gives greater flexibility). A further development would be the division of the pteromorphae into two along this groove — if of advantage to the animal. The other genera have been sufficiently discussed. The following diagram will make this relation clearer:



To facilitate the placing of species in these groups, the following key will be found useful:

1. Lamellae a narrow projecting blade 2
1. Lamellae closely appressed to cephaloprothorax for most of its extent 3
2. Pteromorphae, if not convex in outline both anteriorly and ventrally, only slightly sinuous along ventral edge ..... *Protokalumma*
2. Pteromorphae with anterior or antero-ventral edge distinctly emarginate and more or less pointed ..... *Parakalumma*
3. Pteromorphae with ventral edge sinuously convex ..... *Neoribates*
3. Pteromorphae with ventral edge distinctly emarginate 4
4. Abdomino-cephaloprothoracic suture distinct and entire 5
4. Abdomino-cephaloprothoracic suture lacking or partially lacking or indistinct 6
5. Pteromorphae attached along the sides ..... *Zetes*
5. Pteromorphae, at least anteriorly, attached on dorsum (teste Oudemans) *Sandenia*

6. Abdomen without caudal appendage; ventral openings distant. . *Galumna*
6. Abdomen with caudal appendage; ventral openings rather approximate *Centroribates*

N.B. *Zetes* with surface sculpture are to be segregated in the subgenus *Kratzensteinia* and *Galumna* so differentiated in the subgenus *Vaghia*.

Follows the description of our eastern representatives of the genera *Parakalumma* and *Neoribates*. To this I also add the description of the only other species of *Parakalumma* known to me, i. e. the genotype.

Parakalumma robustum (Banks) 1895

Plates 1 to 3

Diagnosis: — Body broad, anterior and posterior outline of notogaster flattened, the anterior part yellowish; rostrum narrowed, its sides forming an acute angle; lamellae well developed, projecting from cephaloprothorax as narrow blade; interlamellar bristles very long and stout; pteromorphae pointed anteriorly, slightly concave-sinuate postero-ventrad of point, not extending to rostrum; pseudostigmatic organ pointed, serrate; camerostome narrow; ventral plate without mesial pseudoforamen but with anterolateral anal pair; post-anal bristles short.

Form: — As seen from above, broadly ovate, with flattened posterior end and pinched rostrum; pteromorphae extending not quite to anterior end of lamellae, anterior end distinctly pointed, posterior end appearing pointed; lamellae forming a distinct notch on sides of cephaloprothorax; as seen from side roughly semicircular, dorsal outline high, arched, continuous with cephaloprothorax, posterior end rounding downward into the markedly sinuous ventral outline (fig. 25).

Cephaloprothorax (figs. 1, 16 and 17) broadly deltoid from above, arched conic from side with depressed to concave tip; posterior sides of rostrum concave, the apex narrowly rounded; bristles well developed and barbed (fig. 23) rostral bristle the shortest, interlamellar bristles very long and stout, extending beyond the other two pairs and forming a conspicuous feature of the species; lamellae slender, blade-like, broad at base, with a finger (which represents tectopedium I) at middle of ventral edge (figs. 16 and 17) and a socket below base of finger, apex notched above to receive bristle (one specimen from Ithaca, N. Y. has the lamellae curving regularly towards center until they meet, thus forming a semi-oval ridge about the vertex, and thus placing the lamellar hairs very closely to each other in center of cephaloprothorax. This

individual is otherwise normal); depressed area of rostrum angularly ovate; tip of rostrum sinuate, lower edge rendered invisible from above by its anterior bulge; tectopedium I rudimentary, forming an appendage to lamella; pseudostigmata cup-shaped, with heavy rim (figs. 2, 3, 8, 15, 16), rim sinuate anteriorly; figure 2, where *l* = edge of lamella and *pt* = edge of pteromorpha, shows the sinus for the organ, as seen between these two structures; here also the organ is seen as coming through a small aperture at bottom of the pseudostigma; pseudostigmatic organ medium long (about 95 microns), slender, usually held at right angles to median plane, slightly and gradually clavate, curved at base (figs. 2, 3 and 16), shallowly but sharply serrate all around, 6–8 serrations in its length, apex tapering to a long point, "eye" small, ovate; indistinct.

Notogaster (figs. 1 and 5) high, regularly convex, smooth, shining except unpigmented area which is coarsely granular; anterior edge distinct, slightly overlapping cephaloprothorax; margin not thickened; biangulate so as to form a medial and two lateral sectors; medial sector slightly convex, angles rounded so as to form a flowing outline; lateral sectors meeting medial sector at an angle of about 140°, slightly concave just posterior to angles as well as anterior to pseudostigmata. Between these two curves the outline of these sectors is straight (see figs. 15 and 16 in which the notogaster is shown disjointed from the cephaloprothorax, leaving a fissure between the two). In looking down upon a mounted specimen, the appearance of this area is very different. This is due (1) to the transparency of the chitin, so that underlying structures are perfectly visible (2) to the angle of vision (about 50°). This angle is great enough to cause the posterior part of the cephaloprothorax with its depending processes (dotted line in figure 1) to appear below and to the rear of the anterior edge of the notogaster. In figures 15 and 16, these processes appear forward of the notogaster. That this is more correct is evident from figure 17 where this process (seen above the lamella and below the pseudostigmatic organ) is directed slightly posteriorly when the dorsal outline of the cephaloprothorax of this figure is held at the same angle as seen in figure 25. Thus this process, in relation to the plane of the lower surface of the body, slopes slightly backward. In figure 16 it is distinctly foreshortened, in figure 15 the dorsal surface is pressed down until it is horizontal instead of at 130° to the ventral plane. Sides of notogaster curving downward to form the rectilinear pteromorphal attachment. Apex (or peak) slightly posterior to center, anterior slope being slightly straighter than posterior slope; posterior portion of notogaster curves regularly down-

ward by a full curve to form posterior rim of abdomen and continues downward but, becoming more constricted, clips over ventral plate by a wide margin which narrows gradually anteriorly, terminating anterior to posterior end of pteromorphae; muscle attachments and chitin ridges showing through; areae porosae: anterior lacking; adalar small, subdeltoid, indistinct; mesonotal small, broadly ovate, angular, with vermiform appendage (see fig. 4, which is drawn as viewed from exactly opposite); posterior similar to mesonotal but with pseudoforamen at smaller and medial end instead of vermiform appendage; pseudoforamina as in figure 1. In an individual so thinly chitinized that its internal structure is quite visible, there appears a network of fine lines running between these and other more deeply seated pseudoforamina, as illustrated in figures 5 and 26. These structures, although still a mystery, are included to further call attention to their existence, especially as they seem to illustrate a new type. Certainly the vermiform appendages seem to be sensory (and possibly aborted or metamorphosed bristles).

Pteromorphae (figs. 1, 6, 21) smooth, appearing pointed at both ends when viewed from above, widest anterior to center, bluntly angled behind, antero-dorsal margin long, with thickened rim, convex distally, antero-ventral margin equaling antero-dorsal, but more horizontal, concave distally, meeting the antero-dorsal at a sharp angle but so that the point is directed neither anteriorly nor ventrally, postero-ventral margin long, gently convex, rounding very gradually into the antero-ventral margin, postero-dorsal margin short and nearly straight; veining diffuse from a long semiovate area, the various rays breaking up into fine lines; anteriorly not reaching to apex of lamellae, ventrally closing over leg cupboard to near tips of IIIrd and IVth apodematal processes (fig. 8) and covering tectopedia III.

Ventral plate (figs. 6, 8, 9) slightly granular, especially about center; considerably narrower than notogaster, anteriorly deeply emarginate to receive camerostome; tectopedium II (Arabic numerals in figures) rectangular, broadly but shallowly emarginate anteriorly, with a short, curved bristle inserted posterior to center; tectopedium III spoon-like; tectopedium IV elongate triangular with posterior margin broadly and shallowly emarginate; apodemata I and II (letters in figures) elongate and subparallel, II almost reaching genital aperture; apodemata III and IV short and spoon-like when viewed from below. Sternum (fig. 8) with well-developed process housing apodemata II, processes I and III developed but not reaching their apodemata; *genital aperture* more than its length from camerostome, slightly broader than long; preceded by

three pairs of short curved hairs (the sternal hairs), of which the posterior two are approximate, the first pair being midway between the two apertures; genital covers normal, each with five short, curved hairs, of which the anterior three are approximate, leaving the posterior two to form a separate group; parasternum I with a rather long, straight bristle; other parasterna bristleless; acetabulum III (fig. 9) with fairly long, straight bristle; mesial pseudoforamen lacking; *anal aperture* close to posterior edge of ventral plate, posterior border quite straight, antero-lateral corners broadly rounded off and offset by a pair of approximate, slender, curved bristles, anterior border with projecting, emarginate lip, anal pseudofissurae small, distad of center, very close to aperture; anal covers deeply emarginate at antero-median corner, each with a pair of fairly short bristles rather close to the median line; postanal bristles well developed though short, the inner pair slightly more separated than anal cover bristles, slightly closer to each other than to outer pair; preanal process slender. One specimen was found with three bristles on left anal cover (fig. 7). Cupboard (fig. 9) with three indistinct, median, subparallel ridges and a similar anterior ridge.

Camerostome (fig. 6) ovate, anterior rim sinuous (figs. 16, 17); labium closing proximal half, anterior margin formed of two units, a median, formed of two broad emarginations for housing the two maxillae and a lateral, formed of a more protruding diagonally truncate shoulder for attachment of palp (see figs. 18 and 19, the latter representing the hypostomal plate as seen from behind and slightly from one side); postero-lateral margin appearing smoothly rounded from above, slightly angular when viewed obliquely (fig. 8), decidedly angular from side (figs. 18, 19), armed with a pair of long, rather slender, remote bristles situated $\frac{1}{3}$ distance from the anterior to the posterior margin; maxillae (figs. 18 and 19) with large basal piece whose anterior margin is armed on median line with a conspicuous tooth and on outer margin with a short tooth. These teeth enclose a somewhat ovate, unpigmented part whose apex is pointed. Base armed near disto-median area with a short bristle, outer portion of maxillae composed of a curved, cuneiform plate at whose distal end there is a very small, obcuneiform piece, distad of which is the cutting plate with its blackish teeth. Ligula (fig. 20) clavate, apex armed with a minute point. Palp (fig. 20) of five segments; proximal segment twice as broad as long; second segment as broad as proximal and twice as long as broad, cylindrical, tapering somewhat at apex on outer side only, armed with two, long, stiff, subopposite bristles; third segment slightly narrower than apex of preceding, as long as broad, obliquely truncate, armed on

outer side with a long, slender bristle; fourth segment still narrower, oblique at base and apex, armed on outside with two long, slender, subopposite bristles, distal segment as broad as penultimate, compressed, as long as second segment, tapering by gradual stages, covered by many fine, curved hairs; mandibles (figs. 14 and 22) normal for the group, lower ramus with middle tooth small.

Legs with tri-hetero-hamate ungues, tibia I the broadest but shortest, tibia IV the longest, genual I slightly longer than genual IV, femur I the largest, femur III the shortest, coxa IV the largest. Leg I (fig. 10, outer aspect — as with the others) the strongest, *tarsus* with at least seven fairly long, often decurved bristles on sides and dorsal face, one of them somewhat barbed, at least five finer ones about distal end, three long, slender, plumose bristles on ventral face, a long, fine, barbed bristle on outer side near base; *tibia* shorter, very broad at distal end, major bristle somewhat remote from distal end of segment, reaching nearly to distal end of leg, preceded by a long, fine bristle, on ventral face two long, slender, plumose bristles inserted somewhat proximad of plane of major bristle, on each side and inserted opposite the plumose bristles a long, fine bristle, no bristles proximad of or about middle of segment; *genual* slender, broadest at distal end with three bristles about distal end, a plumose one on ventral face, a longer one on dorsal face, and a fine, more posteriorly situated one on side; *femur* with high, arched, dorsal outline, broadest at center, proximal end pedunculate, with two slender bristles on dorsal face, the posterior-most at center, a shorter one on outer face inserted slightly distad of center, two longer ones on ventral face, the anterior one inserted at about the middle, the posterior one near base of peduncle and sharply bent distally. Leg II (fig. 11) the shortest, *tarsus* with at least four plumose bristles on dorsal face and three on ventral face, a barbed one on inner face inserted near proximal end, and at least five fine ones about apex; *tibia* sinuous, broadest at distal end, with major bristle at apex of distal end, a plumose bristle proximad of it, two on ventral face and a slender one on inner face near distal border; no bristles proximad of or about middle of segment; *genual* sharply pinched in at middle of ventral face, bearing three bristles about distal end: on dorsal face a fairly long, plumose one on inner side and a short, heavy one on outer side, on ventral face a long, fine, recurved one also on inner side; *femur* oblong, drawn out downward into a broad peduncle, the genual attached at dorsal corner, ventral corner rounded, a slight flange running along ventral face, armed with five plumose bristles of which two are situated on dorsal face, distinctly anterior to center, a rather short one more proximally

inserted on outside near dorsal edge, and two long ones inserted on ventral face, the distal one anterior to center, more barbate than plumose, the other and proximost inserted dorsad of flange. Leg III (fig. 12) nearly equal to the first, *tarsus* with strongly convex dorsal face armed with at least three, short bristles distad of center, five fine ones about apex and three plumose bristles along ventral face; *tibia* very slender, cuneate, broadest at distal end, major bristle close to distal edge, sharply recurved (i.e. so as to point upward to forward when in motion), a long, plumose bristle on ventral face inserted near apex, and a simple more proximad bristle on outer face; *genual* curved, broadened below at distal end, with a short curved bristle at center of dorsal face and a slender one on outside at distal end; *femur* broadest at middle, tapering distally, genual attached at center, proximal end truncate with a small articulating head at ventral angle, a narrow keel along ventral edge, dorsal face with a medium long, simple bristle inserted at center, a shorter, more proximally inserted one on outer side near dorsal edge and a long, slender, barbate bristle inserted at center of ventral edge within the flange; *coxa* irregularly globular with an imperfect flange along ventral face, femoral articulation at antero-ventral angle, body articulation at right angles to this, imperceptible from outer side, armed with two medium long, fairly straight bristles, one at femoral articulation, the other at distal end of flange. Leg IV (fig. 13) the slenderest and with fewest bristles, *tarsus* very slender, with but one slender bristle on upper face, about five about apex, three fairly long plumose bristles along ventral face; *tibia* long and slender, cuneate, broadest at distal end, with only two fairly long, plumose bristles, one on each side, near apex, on ventral face; *genual* somewhat curved, broadest at apex, with a short bristle on dorsal face near distal end and a rather short, plumose bristle at distal end on ventral face; *femur* oblong oval, truncate at distal end, with a heavy articulating neck at proximal end on ventral face, a narrow keel along ventral edge, a rather short, plumose bristle on dorsal face on distal third, and a fairly long, slightly barbed bristle on ventral face opposite the dorsal bristle; *coxa* bluntly conical, truncate along ventral face, and furnished with a well-developed keel, which is concave sinuate at middle, femoral articulation at ventro-distal angle, below it a simple bristle, body articulation invisible from outside at right angles to femoral articulation.

Color: — Reddish tan, thinner parts more yellowish, with a broad unpigmented area at distal end of notogaster, indicated by ray-line in figures 1, 15, and 16.

Dimensions: — Fifteen specimens measured: twelve from Ithaca,

N. Y. and three (females) from Fort Lee, N. J. The dimensions for the largest and smallest, as also the averages for the five New York females, the seven New York males, and the three New Jersey females are presented in the following table in microns.

	N. Y. Max. ♀	Ithaca N. Y. 5 ♀	Ithaca N. Y. 7 ♂	Ft. Lee N. J. 3 ♀	N. J. Min. ♀
Total length of body	840	824	782	773	750
Length of notogastral plate	690	677	642	643	605
Breadth of notogastral plate	585	577	544	549	525
Length of pteromorphae	440	420	403	405	380
Interlamellar bristle span	100	99	95	100	95
L. of vent. plate on median line	610	594	557	562	535
Camerostome to genital aperture	115	100	103	105	97
Length of genital aperture	95	93	83	83	80
Breadth of genital aperture	100	98	92	95	90
Genital aperture to anal aperture	205	197	184	192	180
Length of anal aperture	180	172	161	153	150
Breadth of anal aperture	185	174	163	161	155

From this it will be seen that: (1) the males average smaller than the females, but only by about 40 microns or one fortieth their total length; actually the two intergrade, making size of no practical value in determination of sex; (2) the species becomes smaller with decrease of latitude; (3) there is considerable range in size; (4) comparing dimensions of breadth of notogaster, the males average more slender; (5) the interlamellar bristle span is quite constant (it is difficult to know if the difference is due to actual differences or to apparent differences due to oblique vision in specimens which do not set perfectly level. This applies just as much to all other measurements, though the greater the measurement, the greater the apparent discrepancy); (6) the breadth of the apertures of the ventral plate are very slightly broader than long; (7) there are no valid or practical differences in dimensions of structures of the ventral plate between males and females. Banks types from Long Island, N. Y. (and New Jersey) were .75 mm. long.

Type locality: — *Sea Cliff, Long Island, N. Y.*, where Nathan Banks secured three specimens.

Cotypes: — In Museum of Comparative Zoölogy, Harvard University.

Material examined: — *Falls Church, Va.*, collected by Nathan Banks, two specimens; 26B78.

Fort Lee, N. J.; Banks; 3 specimens; 26B79.

Monroe, Conn.; picked from moist oak and maple leaves in rift on ground in dry upland woods; Lydia Jacot; June 19; 3 specimens; 261101.

Mount Carmel, Conn.; under rotten log; April 18; Philip Garman; 1 specimen; 26G4.

Gloversville, N. Y.; April 17; Axel Olson; 1 specimen; 17701.

Cayuga Heights, Ithaca, N. Y.; picked from moist leaves and decaying twigs; March 31 and April 1; Jacot; 28 specimens; 17201 and 17301.

Enfield Gorge, central New York; under surface of boards, bark, etc.; April 5; Jacot; 4 specimens; 17401.

Michigan Hollow to *West Danby, central N. Y.;* probably under surface of bark, decaying twigs (or stones); April 8; Jacot; 1 specimen; 17501.

Other material: — Banks does not again record this species. In the original description he lists it from Washington, D. C., 1 specimen.

Ewing (1909b, p. 355) redescribes it as from Urbana, Ill. The description, however, shows this material to be the next species, in the following respects: he does not mention the conspicuous, unpigmented spot at anterior edge of notogaster; pteromorphae are reported as projecting beyond tip of rostrum, and as rounded in front, anal covers as situated half their length from posterior margin of abdomen, total length as .88 mm.; on plate 33, fig. 42 he figures the pseudostigmatic organ of *N. quadrisetosus;* in fig. 4b he figures the four long projecting postanal setae of the same species.

The following references are merely relists: Banks 1907b, p. 611; Ewing 1910a, p. 57; Michael 1898, p. 26 (*O. emarginata* is described under the name *O. robusta*); Berlese 1914, p. 128 (called black!); Oudemans 1919, p. 21.

Habitat: — From the above records it may be stated to be most at home among dead leaves of the woodland floor, though it also occurs under other suitable litter as dead branches, bark, and logs. Although the writer has many lots of Oribatidae from under surface of bark, boards, branches, etc. of this region, they yield no further specimens of this species. It may, therefore, be considered to be rare or local.

Geographical distribution: — Thus this species has been collected from the vicinity of Washington, D. C. (Falls Church, Va.) north to northern Connecticut and westward to central New York. It thus inhabits the Upper Carolinian and Transitional zones of the eastern states.

Phylogenic relations: — This eastern North American species is most closely related to the eastern Asian *P. lydia* Jacot 1923 (see below),

which resembles it in having the anteriorly emarginate pteromorphae, the unpigmented notogastral area, the slender, lanceolate pseudostigmatic organs, very similar lamellae, and a truncate posterior outline; it differs, however, in the Asiatic species being more slender, deeply emarginate pteromorphae, shorter interlamellar bristles, tectopedia I not fused to lamellae, different arrangement of areae porosae and pseudoforamina, both above and below, presence of mesial pseudoforamina of venter, fewer bristles on forelegs but more on hind legs, and in the weaker development of the plumose bristles. This very close affinity forms another of the biological links between these remote areas.

Eggs: — Were not observable in any of the individuals examined.

Plates 1–3

Figures 1, 6–14, 16–19, 21	drawn	under	16 mm.	obj.	and	x 10	occ.	giving	ratio	100
Figure 5	"	"	16 mm.	"	"	x 8	occ.	"	"	80
Figures 15, 20, 22–23	"	"	8 mm.	"	"	x 10	occ.	"	"	200
Figures 2–4 and 24	"	"	4 mm.	"	"	x 10	occ.	"	"	440
Figure 25	"	"	– – – – – – – – – – –	"	40

Neoribates quadrisetosus (Ewing) 1917

Plates 4 and 5 (in part)

Diagnosis: — Body broad, anterior and posterior outline of notogaster blunt pointed, the anterior part pigmented; rostrum broad and blunt, its sides forming an obtuse angle; lamellae inconspicuous, appressed to cephaloprothorax, the bristles converging; interlamellar bristles quite erect; pteromorphae rounded anteriorly, somewhat sinuate antero-ventrally, extending well beyond lamellae; pseudostigmatic organ clavate with rounded point; camerostome broad; ventral plate with anterior pair of gular bristles very close to anterior edge, with postanal bristles very long, projecting well beyond posterior border of abdomen and with anal slits remote and oblique; hairs of legs less barbed and plumose than in preceding species, several with different insertions.

Form: — As seen from above (figs. 26–27) ovate, with rather flattened to rounded posterior sides and impressed rostrum base; pteromorphae extending not quite to end of rostrum; anterior end distinctly rounded, posterior end appearing pointed; as seen from side, broad, cuneate, rounded behind; dorsal outline smoothly arched, notogaster continuous in outline with cephaloprothorax and venter.

Cephaloprothorax (figs. 25, 34–35) from above, unusually broad and

obtuse, sides formed of two faces meeting on line of lamellar bristles, proximal face very slightly convex, distal face short, very slightly concave, making the cephaloprothorax unusually broad between interlamellar bristles, very much wider than interlamellar bristle span, rostrum meeting distal face of cephaloprothorax at a broad, obtuse angle, rostrum very broad at base, short, the sides meeting at apex at an obtuse, broadly rounded angle; lamellae (figs. 33–35) a narrow, chitinous band appressed to cephaloprothorax so as to be quite inconspicuous, quite separate from tectopedium 1, which consists of a narrow band bent dorsad to house the major bristle process of tibia I (see fig. 34, which, seen from above, gives the appearance of having tectopedium I under the lamella, while figs. 33 and 35, which are from the side and somewhat below, show the two structures to be quite free, though very close). Apex of lamellae notched to receive bristle, as seen from above much resembling the condition found in the genus *Zetes;* lower edge of camerostome thickened into a band which widens distally so as to include insertion of rostral bristle (fig. 35). This band is the continuation of ventral edge of leg cupboard. End of rostrum from side not conspicuously incurved at tip. Sides of cephaloprothorax just distad of insertion of leg I, impressed so that the area ventrad of end of lamella (i.e. along which lies anterior edge of pteromorpha) projects as a blunt ridge (fig. 27 where the depression is shaded). Bristles well developed, weakly and sparingly barbed, lamellar bristles almost meeting on median line; interlamellar bristles curved sinuate, quite erect; thus the appearance of these bristles, from above, is very different from that of *P. robustum;* pseudostigmata ovate, inconspicuous, not protruding, flaring outward posteriorly; organ (fig. 28) long pediceled with an elongate, obovate, blunt-tipped head, which is finely bristly along its edges. Ewing's figure is good. Eye elongate oval, coarsely granular when undehydrated.

Notogaster (fig. 26) medium high, regularly convex, smooth, shining; anterior edge distinct, margin thickened above pseudostigmata (fig. 35), straight to slightly convex as seen from above, meeting on median line by a broadly rounded, obtuse angle; areae porosae: anterior (fig. 33) small, broadly fusiform; adalar invisible from above, from sides (fig. 33) semiovate, the posterior portion broadest and separated as a lobe with a heavier rim, the lower margin more thinly chitinized (with the appearance of a slit); mesonotal slender, V-shaped, very distant; posterior similar to mesonotal but the anterior ones much broader and angularly U-shaped, under high magnification appearing as a thinly chitinized area with a thick rim; no vestige of vermiform or hair structures; pseudoforamina as in figure 26.

Pteromorphae (figs. 26, 27, 33) very much resembling those of *Zetes* but emargination more anterior and much more shallow, anterior margin slightly thickened only along proximost part, its dorsal portion broadly rounded or convex, thus forming a very broad and blunt anterior edge (in sharp contrast to *P. robustum*), posterior margin with angle very high, forming a long oblique postero-ventral margin; no evidence whatever of a mesial groove (as in *Zetes*); veining similar to that of *P. robustum*, but much less evident, springing from a bluntly conical area (seen very much foreshortened in figure 26).

Ventral plate (fig. 27) smooth, sometimes appearing slightly granular in irregular patches, probably due to dirt; nearly as wide as notogaster, anteriorly with broad and shallow emargination for camerostome; tectopedium II narrower than in *P. robustum*, posterior end tapering, anterior end oblique, with the bristle inserted anterior to center; tectopedia III and IV similar to *P. robustum*, the latter less prominent; apodemata similar to those of *P. robustum* but with sternal processes well developed, meeting both apodemata I and II, the lower ones extend from the very short apodemata III and IV and fuse *above genital aperture* which is *less* than its length from camerostome and about as broad as long; gular hairs with first pair close to camerostome, the others not close to genital aperture though on proximal half of their area; covers with bristles similar to those of *P. robustum;* bristle of parasternum I short; mesial bristles present but short; *anal aperture* with straight parallel sides, anterior edge straight to very slightly concave, antero-lateral corners obliquely cut off, posterior margin gently convex, the corners rounded, lip unusually broad, with a broad notch at center; entire margin thickened, broadest anteriorly; anal pseudofissurae well developed, distant, oblique, diverging posteriorly, antero-lateral pores present, indistinct, more distant than in *P. robustum*, hairless; posterior bristles very long, much surpassing posterior end of abdomen, the inner pair closer to outer pair than to each other; other pseudoforamina seem to be present but paucity of material precludes determination; anal covers with two pairs of bristles more remote from median line and from each other than in *P. robustum*. Cupboards (fig. 33) with a strong median ridge and three minor ones. In this figure note that tectopedium II surpasses the pteromorpha at its emargination. Study of other species with emarginate pteromorphae reveals the fact that the emargination of the pteromorphae is necessary to fit around the highly developed, obliquely placed, second tectopedium; the bristle on this tectopedium registering the full closure of the pteromorpha.

Camerostome (fig. 27) unusually broad, anterior edge sinuous,

labium much shorter than broad, its bristles short, inserted close to distal edge, remote from each other; mandibles (fig. 36) with stout, barbed bristles; major article with high, arched dorsal outline proximad of bristle, lower or articulated ramus with three distinct cusps: a large proximal, a small median, and a double distal. In the latter the two cusps are unequal, i.e. there is a longer, distal one on outer side and a shorter, more proximal one on the inside. The two, however, distinctly form a single unit, being broadly separated from the smaller median cusp; major ramus with a simple, distal cusp separated by a deep notch from a broad, slightly emarginate, median cusp which is in turn separated by a broad, offset ridge which sheaths the proximal cusp of lower ramus. Thus the double, lower, distal cusp and the reduction of the median cusps is strikingly different from the condition in *P. robustum*.

Legs with tri-hetero-hamate ungues, similar to those of *P. robustum*, but bristles less heavily barbed or plumose; genual I stouter. Leg I (fig. 29) relatively shorter than in *P. robustum*, *tarsus* with all the bristles shorter, fewer on dorsal face; *tibia* with longer major bristle process, all but major bristle shorter, bristles of ventral face barbed (not plumose), lateral bristle lacking; *genual* stouter, all of the bristles smooth, lower face with two long, fine, recurved hairs, one inserted at center, one anterior to center, outer side with a short stiff bristle; *femur* with bristles of dorsal face barbed, as also anterior one of ventral face. Leg II (fig. 30) with *tarsus* having smooth bristles (about 5) on dorsal face, and a barbed one on inside; *tibia* relatively shorter but with major bristle process developed nearly as much as in leg 1, the bristle reaching beyond unguis, two on ventral face barely plumose, a fine one on inside, the dorsal bristle proximad of major bristle weakly barbed; *genual* with four bristles all inserted at apex, one of the two on dorsal face, one only is barbed and as short as the other, of the two on ventral face the longer is barbed; *femur* with dorsal bristles more anteriorly inserted, the proximal one barbed, lateral bristle more posteriorly inserted, smooth, each of the ventral bristles more posteriorly inserted, only the distal one weakly barbed, the other smooth. Leg III (fig. 31) similar to that of *P. robustum* but *tarsus* with a plumose bristle on inside, the ventral bristles only barbed, the dorsal bristles longer and more posteriorly inserted; *tibia* with major bristle not recurved, lateral bristle barbed; *genual* with lower (lateral) bristle somewhat barbed; *femur* with the three distal bristles more anteriorly inserted, the dorsal one also barbed; the posterior bristle short, indistinct or lacking; *coxa* with no keel but a long, smooth bristle on ventral face close to distal end.

Leg IV (fig. 32) differing from that of *P. robustum* in that *tarsus* has barbed (not plumose) bristles on ventral face; *tibia* has a fairly long, smooth bristle on dorsal face, one of the ventral bristles is smooth, the other only barbed; *genual* with but a single barbed bristle on ventral face; *femur* with the two bristles shorter and only barbed, the ventral one very finely so; *coxa* less developed along ventral edge. Thus it will be seen that each segment is different from the corresponding one of *P. robustum* and each from any other.

Color: — Darker than *P. robustum* and without unpigmented area.

Dimensions: — Six specimens measured: one from Arcola, Ill. and five from near Ithaca, N. Y. The dimensions for the Illinois specimen, the largest and smallest from New York and the average of the five from New York are presented in the following table:

	Arcola Ill. ♀	Freevl. N. Y. ♀	N. Y. Av. 5.	Freevl. N. Y. ♀
Total length of body	920	885	842	825
Length of notogastral plate	775	755	714	715
Breadth of notogastral plate	—	620	593	585
Length of pteromorphae	485	470	444	440
Interlamellar bristle span	—	130	119	110
L. of vent. plate on median line	645	365	597	585
Camerostome to genital aperture	80	80	71	70
Length of genital aperture	110	110	107	100
Breadth of genital aperture	—	110	107	100
Genital aperture to anal aperture	230	210	202	195
Length of anal aperture	185	180	172	170
Breadth of anal aperture	—	185	172	156

Although this data is insufficient for drawing final conclusions, it may be noted that (1) the Illinois specimen is larger than those from New York, (2) the only male secured is as small as the smallest female, while (3) its genital opening is relatively still smaller (by 10 microns).

Type locality: — *Xenia, Ohio;* under a log; collected by Henry Ellsworth Ewing. *Types:* — Dr. Ewing's Collection.

Material examined: — *Arcola, Ill.,* from under logs along Kaskaskia River, June 21; Ewing; Ew. B141; 1 female.

Freeville, central N. Y.; marsh; May 20; Nathan Banks; 1 male, 2 females; 26B80.

Cayuga Heights, Ithaca, N. Y., from among fallen leaves, more especially decaying twigs among them and from brush pile; March 31; Jacot; 1 female; 17201.

Danby to *West Danby, N. Y.;* from under twigs and bark; May 13; Jacot; 3 specimens, at least two of them females; 17901.

Other material: — Recorded by Ewing:

Muncie, Ill.; under bark; and *Urbana, Ill.;* 3 specimens (as *O. robusta*).

Habitat: — From the above records it may be inferred that this species is most at home under decaying bark. It has not been found to be common.

Geographical distribution: — Illinois, Ohio and central New York. Careful search in its normal habitat about western Long Island and in Connecticut has not disclosed this species, nor is it in any of Bank's material from the Atlantic seaboard. It thus seems to be one of those species of the Middle West which has extended its range eastward into New York state. It is distinctly a woodland species.

Eggs: — Only the specimens from Freeville marsh, N. Y., taken May 20, contain eggs, about five in number, rather elongate. Females seem much more numerous than males.

Plates 4 and 5

Figures 26, 27, 29–32, 36	drawn	under	16 mm.	obj.	and	x 10	occ.	giving	ratio 100
Figures 34, 35	"	"	8 mm.	"	"	x 8	occ.	"	" 160
Figure 11 (lower)	"	"	8 mm.	"	"	x 10	occ.	"	" 200
Figure 28	"	"	4 mm.	"	"	x 10	occ.	"	" 440

Parakalumma lydia (Jacot) 1923

Plates **5** (in part) and **6**

Diagnosis: — Body fairly large, .68 mm. long, slender, .4 mm. wide, depressed, about 25 mm. high, light red brown, pteromorphae quite thin, and light colored, anterior end of abdomen thinner, colored like pteromorphae; cephaloprothorax slender, gradually tapering, the lamellae seeming curved toward each other at anterior end; cephaloprothoracic bristles long, minutely barbed; pseudostigmatic organs angulate, thick, very gradually widening, tapering much more rapidly to a point; pteromorphae pointed anteriorly, deeply emarginate ventrad of point.

Form: — The general shape of the body (when viewed from above) is elongately pyriform, with a slender, tapering, anterior portion and an elongately rounded posterior portion. The pteromorphae, as usually

seen, are rectangularly pointed anteriorly, straight sided and more pointed posteriorly, the whole making a well-balanced pleasing design.

Cephaloprothorax (figs. 40, 43–46) smooth, from above: longer than broad, gradually tapering, from the side: gradually, convexly descending but with a slope between ends of lamellae, which gives the lamellae the appearance of being produced toward median line at their ends (cf. figs. 40, with 43–45), lower edge sinuate, double, the upper edge protruding laterally beyond the lower (fig. 46); rostrum gradually tapering, suddenly descending at tip and with a slight rim, distinctly constricted at base of rostral hairs; translamellar area abruptly sloping so as to make a dark band when viewed from above, this slope seems to be lacking on the median line. Rostral hairs gracefully curved toward each other, almost touching, roughened by short, blunt barbs, inserted on a tubercle of chitin; lamellar hairs similarly roughened, strong, very long, held erect or vertically in life but pressed downward and forward in mounted specimens, entering slightly elevated, chitin discs; lamellae extending somewhat more than half way along rostrum, slender, nearly straight, slightly sinuous, thickened at anterior end, and terminating abruptly at base of bristle, anterior end on a slightly more heavily chitinized part of cephaloprothorax (fig. 44); figure 43 is as seen at angle of dorsal view in toto mounts, figure 44 as seen removed and viewed perpendicularly; first tectopedia represented by a curved overhanging edge or very slight carina just below lamellae, an area porosa across its center. The area below this edge is impressed, forming a hollow at this point which probably houses the apex of the femur, the genual and base of tarsus when the legs are drawn in. Above the acetabula of leg I is a Y-shaped ridge or thickened band, one of whose legs rests on the top of the acetabulum; pseudostigmata flush with cephaloprothorax, built out posteriorly (fig. 42); pseudostigmatic organs (figs. 40 and 42) elbowed so as to be directed posteriorly, then bent forward again so as to make their general direction nearly at right angles to line of march, somewhat stout, very gradually widening distad and tapering more abruptly to apex, a small granular area near tip, very minutely roughened by tiny barbs thinly scattered on surface.

Notogaster (fig. 40) smooth, anterior edge distinct, biangularly convex, anterior area thinly chitinized, colorless, granular. For limits of this area see dash line in figure 40. Posterior area long, not quite regularly curved, posterior end flattened (slightly emarginate); areae porosae; anterior inconspicuous; antero-posterior elongate; adalar short, narrow, flat edged and angular; postero-mesonotal very narrow, remote from each other; postero-lateral flattened on medio-posterior side; pos-

tero-mesial similarly flattened but on outer sides. These areae seem to be slightly protruding, rough surfaced caps which overhang slit-like openings on the straight edge. In some cases diverticulating, irregularly wavy canals or undulations seem to radiate from them. Pseudoforamina as in figure 40. Their relative positions vary largely according to angle of vision or angle at which the animal is turned toward observer. In no case were hairs seen springing from them.

Pteromorphae (figs. 40, 47–48) pointed anteriorly, the point extending to apex of lamellae and the sinuous inner edge of the pteromorphae just below the lamellae, point with a very slight spine, edge below spine deeply sinuate, forming an obtuse almost right angle with ventral edge which slopes very gradually back to the posterior apex; dorso-posterior edge strikingly sinuous, the whole structure thin, with a very slightly incurved ventral edge; nervures numerous, originating in most part from a rather large central field, rarely branching. Figure 47 is seen almost flat, slightly oblique; figure 48 perfectly flat.

Ventral plate (figs. 41, 37–39) relatively flat, broad anteriorly; anterior edge truncate and slightly sinuous (figs. 41 and 39), not extending far anteriorly, lateral edges sinuous, composed of two distinct lobes, the anterior one rectangular, between the first and second legs, the posterior one triangular and smaller, between the third and fourth legs. A bristle springs from the posterior edge of the anterior lobe and one from the posterior portion of the posterior lobe. Between these two lobes is a narrow and elongate, saucer-shaped, more dorsally located lobe in which fits the second leg. There is a bristle near its apex on ventral side. As the first lobe is the second tectopedium (being situated ventrad of the first leg), this middle, more dorsally situated, lobe must be the third tectopedium (of the second leg), while the triangular, posterior lobe would be the fourth tectopedium. Apodemata as per figures 41, 37–39. Figures 37–39 are views of the seat of the legs viewed at different angles. Figure 39 is the left side viewed somewhat from the outside. Figure 37 is the same viewed much more from the side, less enlarged. Figure 38 is the right side viewed as in figure 41. The various parts may be correlated by noticing their positions relative to the tectopedia. The points of insertion of the legs are indicated by Roman numerals and the tectopedia by Arabic numerals. In figure 37 the ventral plate is shown from the anterior corner of the genital aperture (with the three hairs anterior to it), to the rim of the camerostome and around to the hinge-line of the pteromorpha. Note the two subpteromorphal ridges. In each case the edge of the leg cupboard passes just ventrad of the lower edge of the bases of the tectopedia. Lower edge of

cupboard with a raised, thickened rim, on which rests the pteromorpha when closed (fig. 39). *Genital aperture* small, distant from camerostome, anterior edge very convex, sides convex, posterior edge very concave, anterior half of each cover with three pairs of anteriorly converging pores; posterior half with two pairs of posteriorly converging pores; *anal aperture* large, situated near posterior edge of ventral plate, deeply emarginate on anterior edge, antero-lateral corners absent, sides parallel, posterior edge straight, each cover with two pores just mediad of center, each with a short bristle; lateral slit small, inconspicuous; other pores as in figure 41, some of them bearing hairs (see figure).

Camerostome (figs. 41 and 45) elongate, ovoid, with wide border at sides of aperture; hypostomal plate slightly longer than wide, bearing two fairly long bristles near anterior edge. Mouth parts normal for the group.

Legs with tri-hetero-hamate ungues (not shown in all figures because of superposition), tibia I the broadest, tibia IV the longest and slenderest, genuals I and IV equal, femur II the longest, femur III the shortest, coxa IV the largest. Leg I (fig. 49, inner aspect) having *tarsus* somewhat stout with three plumose hairs on lower side, a slightly barbed bristle on side and a slightly barbed, heavy bristle on dorsal face, four other bristles on dorsal face, one of which is quite stout, and three or four about apex; *tibia* rendered very wide at distal end by a dorsal protuberance from which springs the long, heavy major bristle, with another shorter bristle just anterior to it, a fairly long bristle on each side and two plumose bristles on lower side, all of them about distal end; *genual* with four fairly long bristles; *femur* large, wide, blade-like, with two weakly barbed bristles on dorsal side, two very fine, short bristles on ventral edge, dividing the segment into three equal parts, and another similar bristle on inner side and between the *anterior* dorsal and ventral bristles. Leg II (fig. 50, outer aspect) having slightly more slender *tarsus* which bears three plumose bristles on ventral face, two weakly barbed bristles on dorsal face, the hinder being quite stout, two rather closely spaced bristles about proximal portion of dorsal face, and four or five finer, shorter bristles about apex; *tibia* more slender, with a major bristle on dorsal face, a slender bristle on each side, the outer one being slightly barbed, and a weakly plumose bristle on ventral face, all of them about distal end; *genual* with a slender bristle each on dorsal, inner and ventral faces; *femur* elongate and so curved as to form two slopes on dorsal face, anterior slope with two bristles, the *posterior* one being weakly barbed, ventral face with two straight, slender bristles, the *anterior* one being slightly barbed, a slender bristle on outer side

between *posterior* dorsal and ventral bristles. Leg III (figs. 51 and 53, inner and ventral aspects) the shortest; *tarsus* with three plumose bristles on ventral face, two bristles on dorsal face, two fine ones on side and three or four about apex; *tibia* with major bristle on dorsal face, a plumose bristle on inner side and another on ventral face near distal end followed by a fine bristle, all of them about distal end; *genual* with a short bristle on dorsal face and one on outer side; *femur* wide, blade-like, dorsal and ventral faces sub-parallel and with a fairly long bristle on dorsal and ventral edges just distad of center, another more slender bristle postero-ventrad of dorsal bristle on inner side; *coxa* small, flat, rounded-triangular, with one bristle on ventro-distal edge, a fine one on dorsal face and a Y-shaped extension built at right angles to it for articulation with body. This leg, when seen from above or below, forms a straight line along inner edge of coxa and femur (fig. 53, from below), the coxa is seen to have a longitudinal keel along the ventral edge, with the bristle on inner side as is also the coxal bristle. Leg IV (figs. 52 and 54) with slender *tarsus* bearing three weakly plumose or barbed bristles and a bristle on ventral face, two bristles on dorsal face and five about apex; *tibia* very slender, a short, *slender* bristle on dorsal face, a similar one on outer side and two plumose bristles on ventral face, the posterior-most only weakly so; all of them about distal end; *genual* with a bristle on dorsal and one on ventral face; *femur* long, broad, blade-like with a slightly barbed bristle on dorsal edge near distal end and a plain more posteriorly situated bristle on ventral edge; *coxa* quadrilateral, with rounded corners.

Color: — The general body color is a reddish tan except the pteromorphae, which are a dark cream buff. The light area of anterior portion of abdomen makes it very characteristic (see figure 40, dash-belt).

Dimensions: — Fifteen specimens measured. The smallest, the average, and the largest are given.

Total length of body	652 (674) 705
Length of notogastral plate	508 (549) 558
Breadth of notogastral plate	394 (407) 431
Length of pteromorphae	296 (304) 316
Distance between interlamellar hairs	62 (66) 70
Length of ventral plate along median line	475 (500) 517
Length of genital aperture	62 (71) 86
Breadth of genital aperture	62 (71) 78
Posterior edge of genital aperture to anterior edge of anal aperture	164 (170) 180

Length of anal aperture 123 (126) 131
Breadth of anal aperture 119 (124) 131

Thus this species is distinctly smaller than *P. robusta*. There is a slight tendency toward a larger genital aperture in the female but the difference is so slight that it is rendered useless for distinguishment of sexes, by the amount of individual variation.

Cotypes: — From Tsinan, Shantung, China; no. 223501. Also found at Tsingtao.

Habitat: — Mostly from pile of decaying grass in garden and from grass mats. Also from pine débris on woodland floor, Tsingtao. Obtained from early April until late October. It walks at the rate of 40–50 mm. per minute.

Plates 5 (in part) and 6

Figures 37, 40, 41, 44–54 drawn under	16 mm.	obj.	and	x	10	occ.	giving ratio		100
Figures 38 and 39	"	"	8 mm.	"	"	x	8	occ.	"	"	160
Figures 42, 43, 55	"	"	4 mm.	"	"	x	8	occ.	"	"	440

Oribata corticis Ewing 1913, p. 117, pl. 8, fig. 12 from Baldwin, Michigan, may be a *Parakalumma*.

A careful study of the material at hand, representing the genera *Zetes* and *Galumna*, necessitates the description of several new species. Diagnoses of these species are here presented, pending a detailed report now in course of preparation covering all known species from the States.

Zetes arborea sp. nov.

Fairly large (.83 x .6 mm.); cephaloprothorax fairly long, conical; bristles short and slender, rostral the longest, close to camerostome, lamellar shortest, included, interlamellar caducous, almost equal to rostral but much more slender; pseudostigmatic organs fairly long, slightly recurved, head cuneate, considerably shorter than shaft, striated, bluntly pointed to rounded when seen from above, obliquely truncate when seen from the side, faintly barbed to smooth; pteromorphae smooth, hinge pivot near antero-dorsal angle; areae porosae: anterior very long and narrow if extant, reaching tectopedial plate; adalar cuneate or pestle-like; mesonotal subcircular; no median pseudoforamen; notogastral plate with a vertical grove on median line at posterior end so that it appears notched when viewed from above; gular bristles fairly close; a pair of sternal bristles anterior to genital aperture but remote from it; genital covers with usual four bristles, of which the second, third and fourth are subequally spaced, the first quite close to

second; paramesial bristles not close to genital aperture; postanal bristles subequally spaced, included by line of side of aperture; apodemata II and III very close at mesial end.

Cotypes: — Monroe, Conn.; bark of apple tree, under the "scales"; June 16; Jacot, 9 specimens, no. 26502.

Zetes banksi sp. nov.

Size fairly large (.76 x .6 mm.); quite broad; sides of rostrum slightly concave, rostral bristles lacking; lamellar bristles short, included; interlamellar bristles very short, inconspicuous; pseudostigmatic organs similar to *Z. emarginata* (Banks) but head longer and broader; pteromorphae with anterior end roughened by fine, irregularly parallel ridges near the border; areae porosae: anterior elongate oval, not reaching tectopedial plate; adalar short and broad; mesonotal round-oval; median pseudoforamen present; venter with widely spaced gular bristles, without sternal bristles; usual genito-lateral bristles; bristles of genital covers remote from their median line, three anterior, two lateral, one posterior; paramesial bristles short, in line with ventral edge of genital aperture and its width (on ventral edge) distant from it; postanal bristles in pairs, those of each half approximate, their span distant from median line and from line of sides of aperture.

Cotypes: — Austin, Texas; Banks, 74 specimens, nos. 26B95 a-d.

Zetes californiae sp. nov.

Fairly small (.58 x .4 mm.); not as dark as usual in the genus; cephaloprothorax elongate, conical, its bristles long (interlamellar very long) and finely barbed, lamellar bristles exterior; pseudostigmatic organs long, gracefully curved, widening very gradually into an unusually long, narrow, rounded to bluntly pointed, roughened head; pteromorphae with hinge pivot remote from angle; areae porosae: anterior elongate, reaching tectopedial plate; adalar like a short-bodied wine bottle, neck up; mesonotal angularly oval; with median pseudoforamen; gular bristles rather remote; no evident sternal bristles; genital covers each with four median bristles, the two posterior remote from the two anterior ones; paramesial punctures fairly close to genital aperture; the four postanal bristles subequally spaced, the median pair most widely spaced, the outer ones remote from line of sides of aperture; tibia I unusually short, subequal to genual I.

Cotypes: — Claremont, California; Banks, 3 specimens, nos. 26B96a and b.

Zetes corrugis sp. nov.

Size fairly large (.8 x .53 mm.); dark; cephaloprothorax long, conical; bristles well developed, very slightly barbed, lamellar the longest; pseudostigmatic organ with head subequal to shaft, slightly bent at juncture, head elongate oval, bluntly pointed, markedly barbed; pteromorphae with hinge pivot somewhat remote from angle, ventral edge with very fine, fairly regular corrugations; areae porosae: anterior broadly oval, straddling abdomino-cephaloprothoracic suture and overlapping tectopedial plate; adalar boot-like, toe directed posteriorly; mesonotal round-oval; gular bristles fairly approximate; sternal bristles not evident; genital covers with four subequally spaced bristles in a row considerably mediad of their center; paramesial bristles remote from genital aperture, two pairs of paranal bristles situated anterior to center, the anterior-most close to aperture; postanal bristles subequally spaced, included by line of sides of aperture.

Types: — Middlesex Fells, Mass.; coll. by Nathan Banks, 2 specimens (one with three eggs), no. 2684; with a *Zetes emarginata* (Banks).

Zetes ithacensis sp. nov.

Body fairly large (.7 x .5 mm.), broadly ovate, somewhat depressed; cephaloprothorax short and broad, outline interrupted only by slight protrusion of lamellar plates; insertion of lamellar bristles included, the bristles shorter than the rostral; interlamellar bristles very short, inconspicuous; pseudostigmatic organs long, slender, without distinct head, pencil-like, slightly broader about middle, sharpened at distal end; pteromorphae with pivot considerably anterior to angle; areae porosae: anterior very slender, lying along suture; adalar elongate, slender, ventral end bending posteriad; mesonotal (as seen from above) single, large, circular; no median pseudoforamen; venter with paramesial bristles; genual I unusually long, armed with a very long tactile (major) bristle besides a normally long bristle.

Cotypes: — Ithaca, N. Y.; Cayuga Heights, from decaying twigs and from under face of stones; April 1; Jacot, 15 specimens, no. 17301.

Zetes louisianae sp. nov.

Size medium (.68 x .5 mm.); vertex sloping abruptly to rostrum; rostral bristles well developed; lamellar bristles long, far surpassing base of rostral bristles; interlamellar bristles short and fine; pseudostigmatic organs long, with a slender, pointed, elongately obovate head,

distinctly fimbriate; areae porosae: anterior elongate, reaching tectopedial plate; adalar elongate, narrow, obliquely truncate; mesonotal angularly subcircular; two elongately triangular patches of coarse pseudoforamina each side of median line near anterior edge of notogaster (these may not be specific as I have seen them in some individuals of another species, and not in the majority of individuals); gular bristles distant; sternal bristles absent; paramesial bristles not observable; postanal bristles subequally spaced, the outer ones opposite sides; genital covers with four subequally spaced bristles down the center.

Type: — New Orleans, La.; in nest of ant, *Iridomyrmex humilis;* Banks, 1 specimen, no. 26B82.

Zetes sequoiae sp. nov.

Medium large (.76 x .5 mm.); reddish tan; cephaloprothorax fairly short and convex, the three pairs of bristles well developed and barbate, lamellar included but peripheral, interlamellar stout and stiff, subequal to lamellar; pseudostigmatic organs fairly long, straight and with a slenderly fusiform, symmetrical, pointed and finely serrulate head; pteromorphae with pivot at angle; areae porosae: anterior equilaterally triangular, the outer angle close to base of interlamellar bristle; adalar stocking-shaped, the foot close to hinge, the toe pointed backward (in one case the toe resembles the heel); mesonotal broadly oval; gular bristles remote, a pair of sternal between them, two pairs of sternal bristles on anterior edge of genital aperture, and another pair between these couples but anterior to them; genital covers each with four bristles mediad of their center, posterior one close to margin, anterior one much more distant from margin, the central ones closer to marginal than to each other; paramesial bristles rather distant from genital aperture; postanal bristles four, the outer well within line of sides of anal aperture, inner two closer to outer than to each other; apodemata II and III close to each other, with a long, slender, bristle on surface between their extremities and genital aperture.

Cotypes: — Muir Woods (San Francisco), California: (*Sequoia sempervirens* reserve), picked from sticks, leaves and decaying wood from forest floor; July 16; Jacot, 5 specimens, no. 261602.

Some half dozen species have already been described from the State.

Galumna banksi sp. nov.

Medium sized (.36 x .53 mm.); reddish amber, cephaloprothorax elongate conic; rostral bristles slender, smooth, nearly touching; lamel-

lar bristles similar, shorter, barely reaching base of rostral bristles; interlamellar bristles stout, barbed, subequal to rostral; pseudostigmatic organs straight, fairly long, with very slender shaft, with slenderly ovate head much shorter than pedicel, sparcely beset with fairly long, conspicuous, straight bristles, decurrent at proximal end, blunt at distal end; pteromorphae smooth, with a prominent pseudoforamen distad of groove, and a short, heavy, obliquely set ridge? posterior to groove, near dorsal margin; areae porosae: anterior, if present, very small, oval and nearly posterior to interlamellar bristles; adalar short-triangular; mesonotal oval (as seen from above), close to each other, i.e. low on the sides; median pseudoforamen present; gular bristles fairly approximate; sternal bristles lacking; genital covers each with three bristles along anterior edge; two on and near posterior edge and one near center of anterior half; paramesial bristles remote from genital aperture; postanal bristles subequally spaced, the two median ones more remote, the outer two remote from line of sides of aperture; paranal slit parallel to aperture and at center of side. the bristle considerably posterior to slit.

Cotypes: — Glen Cove, Long Isl., N. Y.; from leaf mold; May 8; Jacot, 2 specimens, no. 201001.

Very similar to the specimen figured by Berlese in 1914, pl. I, fig. 14 as *O. emarginata*, differing therefrom in not having the recurved pseudostigmatic organ and having the median pseudoforamen.

Galumna areolata binadalares subsp. nov.

Differing from the species in having steeper and more squarish vertex, more widely spaced lamellar bristles, adalar a. p. not round but oval, the lower (or outer) being horizontal, the upper (or inner) being nearly vertical, outer mesonotal a. p. very small to lacking, the inner one larger (5–6 times the size of the outer one). There are also other minor differences.

Cotypes: — Falls Church, Va.; Nathan Banks, 14 specimens, no. 26B78.

Galumna areolata halli subsp. nov.

Somewhat smaller (.41 x .55 mm.); pseudostigmatic organs with subtriangular head, i.e., strongly diagonally truncate, the end bristly, seen from above:— slenderly ovate, smooth to roughish, bristles longer, the interlamellar very well developed, subequal to rostral; a pair of sternal bristles near gular bristles and another just anterior to genital aperture; postanal bristles well developed.

Cotypes: — Claremont, Calif.; Nathan Banks, 12 specimens, no. 26B96c.

Differs from *G. californica* (Hall) 1911, p. 643, in being larger, having interlamellar bristles and smooth rostral bristles. It is difficult to believe that the nails of the ungues are as described by Hall, or that the tarsus has as many barbed bristles, arranged as figured by him. The pseudostigmatic organs are very similar when viewed from a certain angle. I have been unable to locate his types!

Galumna flagelliferum sp. nov.

Size large, for the genus (.48–.62 x .67–.79 mm.); rusty reddish, usually roughish; cephaloprothorax short, broad, very steep with a small, bluntly rounded rostrum; rostral bristles posterior to rostrum, short, slender, reaching to base of rostrum; lamellae appearing emarginate from above, actually very narrow; lamellar bristles lacking, puncture very high up and "off" the emargination; interlamellar bristles lacking; pseudostigmatic organs flagellar, recurved, smooth, very fine; pteromorphae with anterior pseudoforamina and diagonal "ridge"; abdomino-cephaloprothoracic suture entirely lacking; areae porosae: anterior elongate-ovate, point outward, diagonal; adalar large, oval, remote from pteromorphal hinge; mesonotal elongate, posterior end more attenuate, diagonal; gular bristles remote, with one or two sternal bristles between them; genital covers each with two anterior marginal bristles and four in longitudinal series chiefly laterad of center, the anterior-most near margin, the next one close to it, the posterior-most on edge and near inner margin, the penultimate near posterior margin; paramesial bristles fairly close to aperture; postanal bristles in two pairs which are remote from each other but included by line of sides of aperture; paranal slit oblique, the puncture remote from aperture and near posterior edge.

Cotypes: — Austin, Texas; in nest of *Eciton caecum;* collected by C. T. Brues; coll. of Banks, 4 specimens, no. 26B85.

Areae porosae much like those of *Oribates longiplumus myrmophilus* Berlese 1914, p. 123, pl. I, fig. 10.

Galumna filata Oudemans 1914, pp. 33–35, pl. 14, figs. 9–18, pl. 17, fig. 16 = *Oribata setiformis* Hall 1911, p. 506, fig. 163. This is evidently not *O. longiplumus* Berlese 1904, p. 30 and 1914, p. 122, pl. I, fig. 9, which has the abdomino-cephaloprothoracic suture "sat conspicuus" and figured as quite distinct, thus being a *Zetes*. The "inner" areae porosae mesonoticae are as far down the sides as the "outer" ones while in *G. setiformis* they are much closer together.

GALUMNA COLEOPTRATUM OCCIDENTALE subsp. nov.

Medium large (.46 x .63 mm. to somewhat smaller), high; cephaloprothorax abruptly rounded, with short, broad rostrum; rostral bristles short; lamellar bristles included, subequal to rostral, reaching insertion of rostral bristles, very fine; plates projecting so as to form prominent angles on sides of cephaloprothorax; interlamellar bristles quite long, barbulate; pseudostigmatic organs similar to those of *G. binadalares* but head barbed posteriorly and coarsely granular; pteromorphae with pivot near angle, diagonal ridge not prominent; areae porosae: anterior small, double to lacking; adalar anterior to pteromorphal groove, unsymmetrically oval, close to pteromorphae; mesonotal oval; a small, roundish, median one, which varies in position from between the pteromorphal grooves to between the mesonotal a. p.; anterior a. p. often followed by two groups of pseudoforamina; gular bristles fairly close; sternal bristles lacking; genital covers much as in *G. binadalares;* antero-lateral punctures more posteriorly situated than usual; paramesial bristles between the aperture and slightly nearer the anal; paranal bristles near center; postanal bristles in two pairs, well included by line of sides of aperture.

Cotypes: — Monroe, Conn.; upland swamp, from cushion moss; March 23; Jacot, 18 specimens, no. 191302.

GALUMNA PAUCISETOSUM sp. nov.

Fairly large (.4 x .6 mm.); cephaloprothorax conic; rostrum slightly protruding; rostral bristles lacking; lamellar bristles considerably anterior to lamellae, long, reaching to beyond base of rostrum, slightly barbed; interlamellar bristles remote, very long and slender, if barbed very finely so; pseudostigmatic organs flagelliform, conspicuously barbed; pteromorphae smooth, with anterior puncture and diagonal "ridge"; areae porosae: anterior slender, oval, remote from insertion of interlamellar bristles, much overlapping the inconspicuous tectopedia I, reaching to pseudostigmata; adalar elongate; mesonotal conical with slightly curved sides, base towards center; pseudoforamina dark and very conspicuous; gular bristles approximate; sternal bristles of lacking; genital covers each with two bristles on anterior margin close to center and four subequally spaced longitudinally arranged bristles, of which the anterior is posterior to outer peripheral bristles, the posterior one is very close to posterior margin while the other two are more laterad; paramesial bristles remote; paranal bristles near center;

two remote pairs of postanal bristles included by line of sides; bristles of anal covers more anteriorly placed than usual.

Cotypes: — Monroe, Conn.; upland swamp, from cushion moss; May 31; Jacot, 3 specimens, no. 193101.

Galumna virginiensis sp. nov.

Medium sized (.37 x .51 mm.); reddish amber to tan; cephalothorax conical, somewhat pointed, bristles long, conspicuously barbed, rostral the shortest, surpassed by lamellar (included), interlamellar the longest, inserted close to edge of tectopedial plate; pseudostigmatic organ long, sharply recurved at middle, the curve greater than a right angle, pedicel very slender, head slender-fusiform, tapering to slender point; upper edge of lamellar plates terminating and bent mediad far down the front of cephalothorax, giving appearance of an interrupted translamella; pteromorphae with anterior pivot at antero-dorsal angle with distinct puncture distad of groove, slightly surpassing lamellae, with diagonal ridge behind groove; abdomino-cephalothoracic suture weak, in some individuals barely distinguishable, in others quite distinct; areae porosae: anterior semioval, barely reaching tectopedial plate; adalar blunt and short-triangular; mesonotal round; median pore present, often eclipsed by contents of digestive tract; posterior edge with two parallel rows of crescentic, large, pseudoforamina as seen from above; gular bristles fairly close; sternal bristles lacking; genital covers each with five bristles: two long (relatively), fine ones on anterior edge followed by a short one, another close to posterior edge and another distad of it far removed from the anterior ones; paramesial punctures midway between apertures; anal cover bristles close to median edge; postanal bristles subequally spaced, often the median pair somewhat more widely separated; the outer two usually distant from line of sides; paranal bristles midway between center and posterior corner of aperture.

Cotypes: — Falls Church, Va.; under board; August 11; Nathan Banks, 23 specimens, no. 26B76.

Although some well chitinized specimens have a distinct abdomino-cephalothoracic suture, it is usually so poorly developed as to show decided affinity to *Galumna*. This relation is further indicated by the reduced lamellae and more specialized pseudostigmatic organs and other minor details.

Holozetes gen. nov.

As *Zetes*, but with tectopedia II so reduced that the pteromorphae close over them and are therefore not emarginate.

Type: — *Galumna texana* Banks 1906b, p. 494, pl. 17, fig. 24; San Antonio, Texas.

Holokalumma gen. nov.

As *Galumna*, but tectopedia II more reduced and pteromorphae unemarginate (entire), closing over tectopedia II.

Type: — *Holokalumma coloradensis* sp. n.

Holokalumma coloradensis sp. nov.

Rather small (.53 x .4 mm.); reddish amber; cephaloprothorax blunt conical, rostral bristles invisible (from above); lamellar bristles extending but half way to end of rostrum, barbed, included?; interlamellar bristles lacking, indistinguishable or caducous; pseudostigmatic organs rather long with an elongate obovate head, shorter than shaft, very slightly barbate at apex; pteromorphae an oval, saucer-like lid, concentrically wrinkled at anterior end, built out as a shoulder at hinge pivot; areae porosae rendered invisible by coating of extraneous matter in the single specimen; posterior edge of notogaster very slightly concave; gular and sternal bristles lacking; genital covers with three bristles in a row mediad of center and a fourth still nearer median edge, first and second, third and fourth subequally spaced, wider space between second and fourth; paramesial bristles rather close to genital aperture; the four postanal bristles included by line of sides of anal aperture, the median pair most widely spaced.

Type: — Mt. Richtophen, Colorado; collected by Baker; collection of Nathan Banks no. 26B101.

Holokalumma floridae sp. nov.

Size medium (.66 x .56 mm.); rusty red; cephaloprothorax rather blunt with short broad rostrum; rostral bristles long, touching, heavily barbed; lamellar bristles longer, but smoother; interlamellar bristles lacking; pseudostigmatic organ short, with large, broad, obovate head whose length equals that of pedicel, though sometimes appearing longer; areae porosae: anterior broad, short triangular, somewhat isosceles, the apex touching tectopedia I; adalar similar but the *apex running out*

upon pteromorphae; notogaster posterior to pteromorphae, pentamerous, the four angles broadly rounded, the central interspace (face) longest and conspicuously concave, the next two faces shorter and barely concave, those next the pteromorphae considerably shorter and slightly convex; ungues tri-hetero-hamate, the lateral hooks strong.

Cotypes: — Cocoa, Florida; collected by J. R. Watson, 5 specimens; collection Nathan Banks no. 26B100.

All type material, after having been used for detailed descriptions and figures, is to be deposited at the Museum of Comparative Zoölogy, Harvard University, as with all of my Oribatoidea.

I wish at this time to express my sincere thanks to Mr. Nathan Banks for the confidence he has shown in me to the extent of offering me his collection for study.

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EXPLANATION OF PLATES

PLATE 1

PLATE 1

Parakalumma robustum (Banks) 1895

Fig. 1. Dorsal view; ratio 100.
Fig. 2. Pseudostigmatic organ emerging from pseudostigma, 1 = edge of lamella, pt. = edge of pteromorpha; ratio 440.
Fig. 3. Pseudostigmatic organ viewed from side; ratio 440.
Fig. 4. Detail of areae porosae; ratio 440.
Fig. 5. Notogaster showing connecting threads of pseudoforamina; ratio 80.

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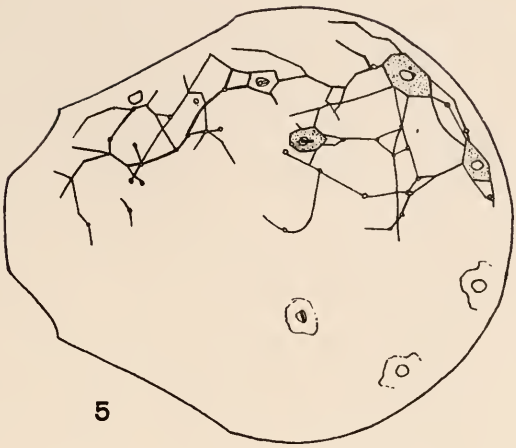

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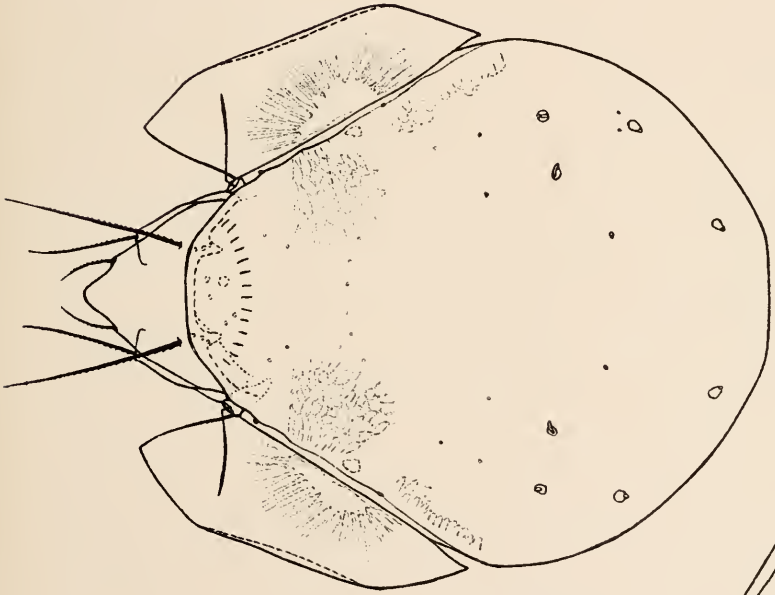

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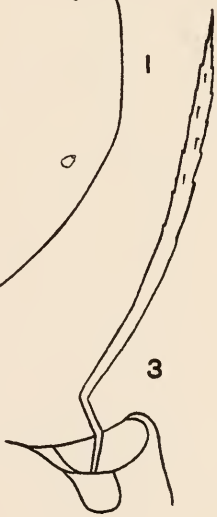

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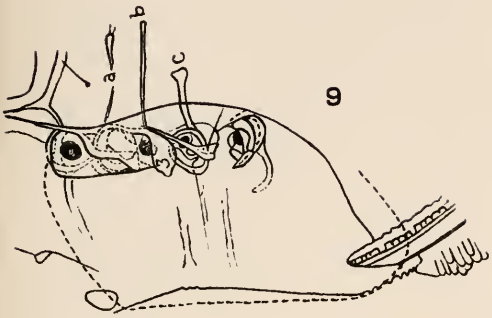
PLATE 2

PLATE 2

Parakalumma robustum (Banks) 1895

Fig. 6. Ventral view, detail on lower side of figure; ratio 100.
Fig. 7. Anal covers, showing exceptional arrangement of bristles; ratio 100.
Fig. 8. Detail of tectopedia (Arabic numerals) and apodemata (Arabic letters), more oblique than in figure 6; ratio 100.
Fig. 9. Detail of right leg cupboard, more oblique than figure 8; ratio 100.
Fig. 10. Leg I, outer aspect; ratio 100.
Fig. 11. Leg II, outer aspect; ratio 100.
Fig. 12. Leg III, outer aspect; ratio 100.
Fig. 13. Leg IV, outer aspect; ratio 100.
Fig. 14. Mandibles, figure on left as seen from below; ratio 100.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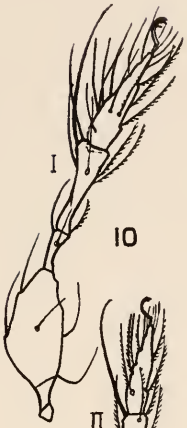
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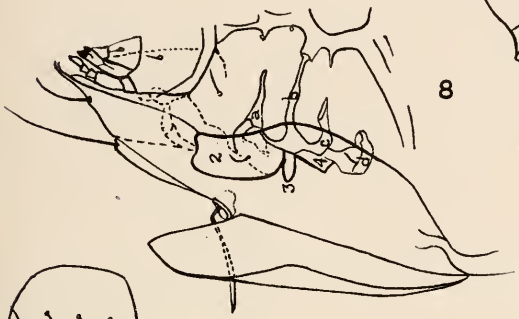
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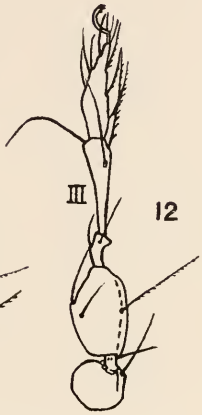
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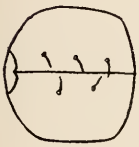
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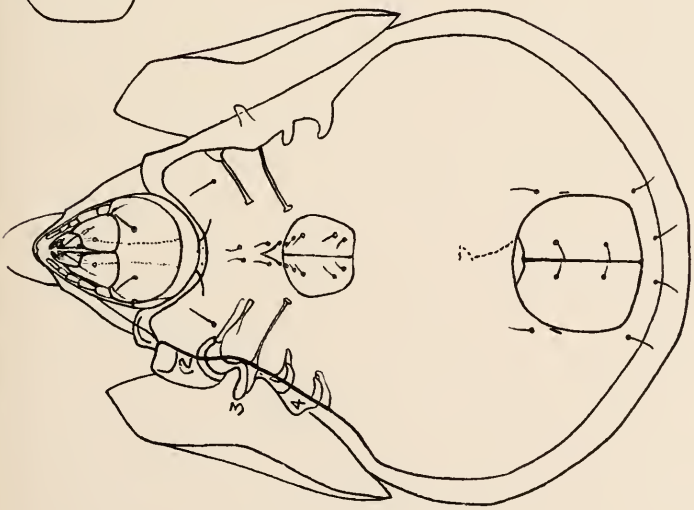
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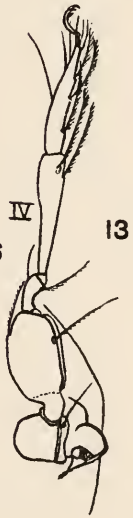
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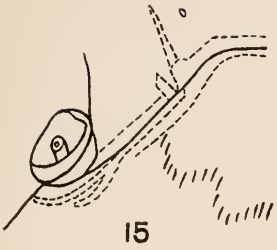
PLATE 3

PLATE 3

Parakalumma robustum (Banks) 1895

Fig. 15. Right pseudostigma and adjoining portion of abdomino-cephalo-prothoracic suture, very much flattened out; ratio 200.
Fig. 16. Oblique view of cephaloprothorax and adjoining parts; ratio 100.
Fig. 17. Side view of cephaloprothorax, showing mandible and palp in situ; ratio 100.
Fig. 18. Labium from side; ratio 100.
Fig. 19. Labium from obliquely behind; ratio 100.
Fig. 20. Palp, maxilla and ligule from below, ligule from side at right; ratio 200.
Fig. 21. Right pteromorpha, showing muscle attachments on notogaster above; ratio 100.
Fig. 22. Mandible; ratio 200.
Fig. 23. Lamellar bristle (above), interlamellar bristle (below); ratio 200.
Fig. 24. Fungus spore occasionally found on the body, size 7 x 27 microns; ratio 440.
Fig. 25. Side view showing angle of epiphragmatic process with vertical; ratio 40.



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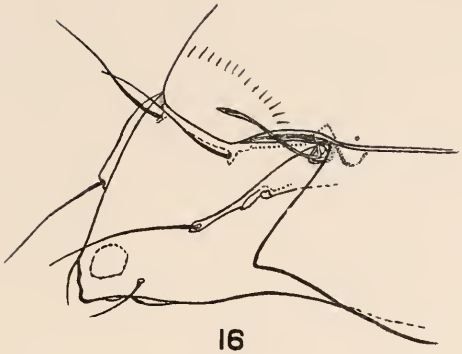

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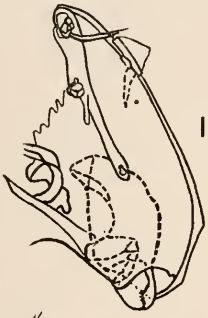

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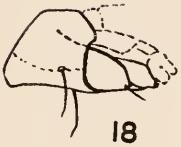

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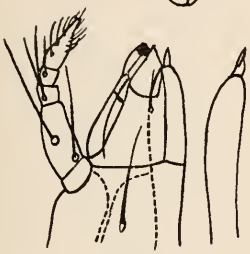

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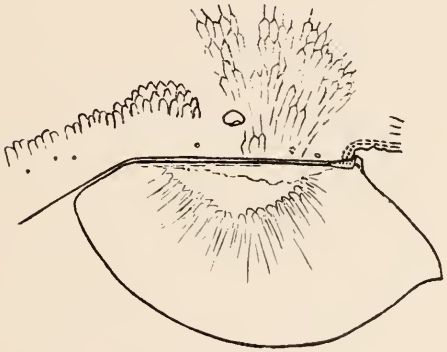

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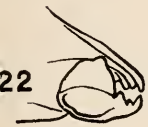

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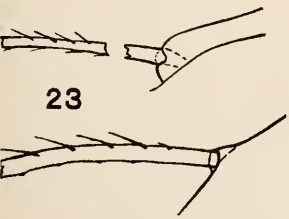

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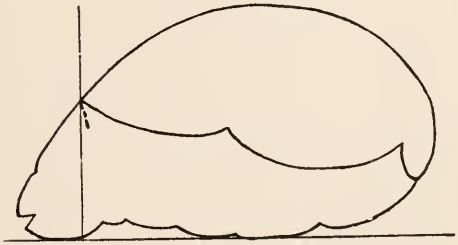

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PLATE 4

PLATE 4

Neoribates quadrisetosus (Ewing) 1917

Fig. 26. Dorsal view, muscle attachments of pteromorphae figured on left side only; ratio 100.
Fig. 27. Ventral view, detail of tectopedia and apodemata figured on right side only; ratio 100.
Fig. 28. Pseudostigmatic organ; ratio 440.
Fig. 29. Leg I, outer aspect; ratio 100.
Fig. 30. Leg II, outer aspect; ratio 100.
Fig. 31. Leg III, outer aspect; ratio 100.
Fig. 32. Leg IV, outer aspect; ratio 100.

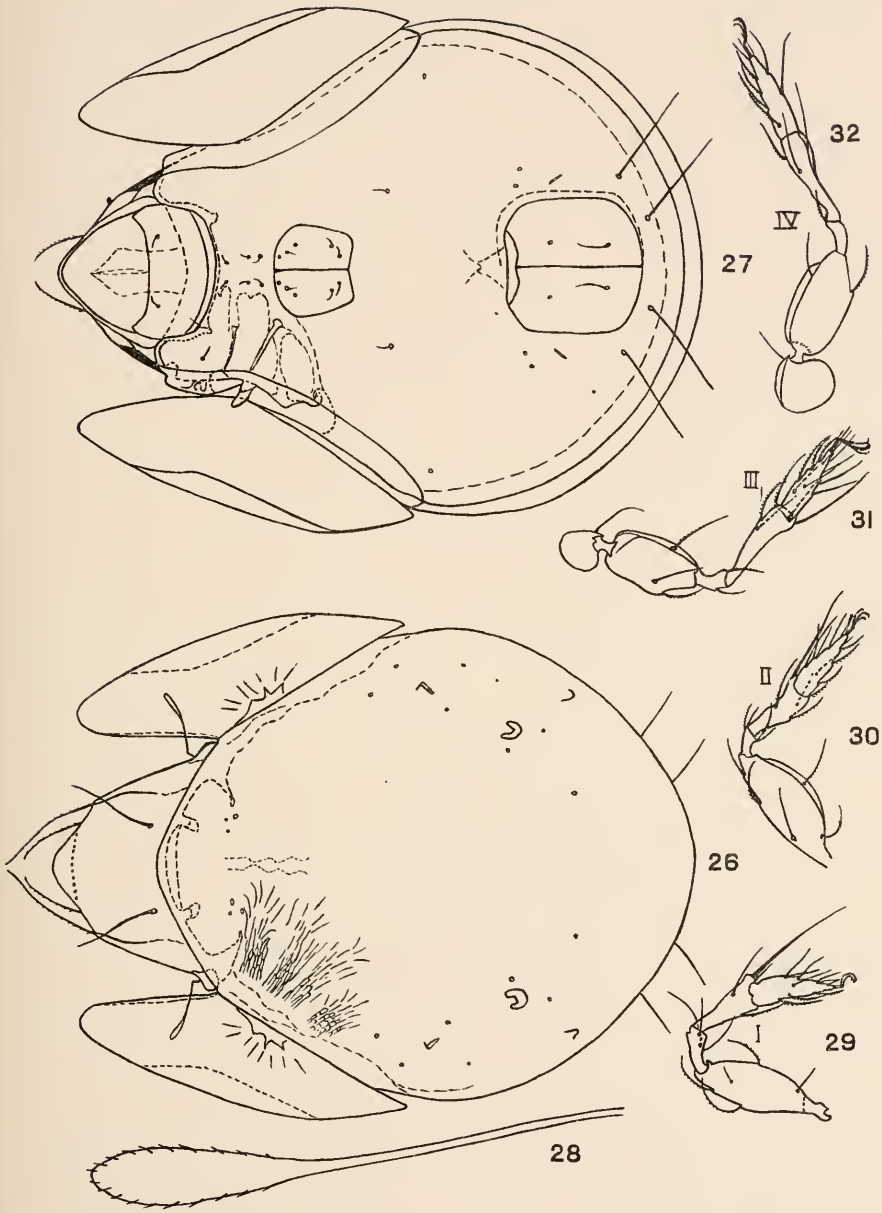
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PLATE 5

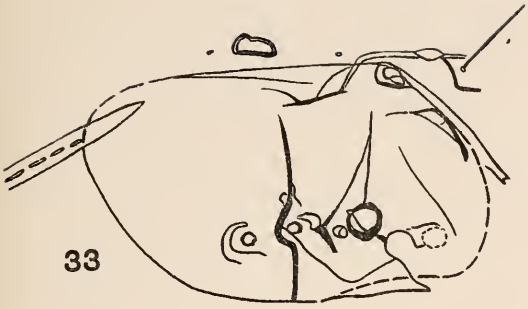
PLATE 5

Neoribates quadrisetosus (Ewing) 1917

Fig. 33. Side, showing position of pteromorpha by a dotted line; ratio 100.
Fig. 34. Left side of cephaloprothorax showing leg I in position when drawn in; ratio 160.
Fig. 35. Right side of cephaloprothorax showing detail of lamella and insertion of leg I; anterior edge of pteromorpha in outline, as also the heavy band of ventral edge of camerostome; more oblique than in figure 32; ratio 160.
Fig. 36. Mandibles; ratio of upper figure = 100, of lower = 200.

Parakalumma lydia (Jacot) 1923

Fig. 37. Left side of ventral plate viewed somewhat from side, showing tectopedia (Arabic numerals) leg insertions (Roman numerals); ratio 100.
Fig. 38. Right side of ventral plate viewed as in figure 2; ratio 160.
Fig. 39. Left side of ventral plate viewed from the outside; ratio 160.



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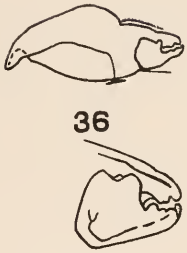

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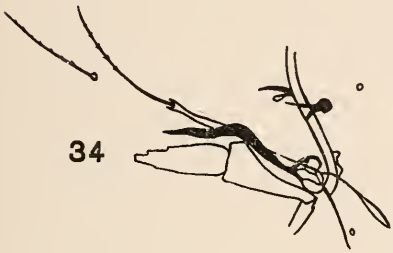

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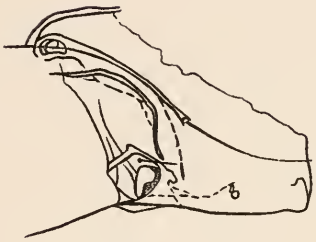

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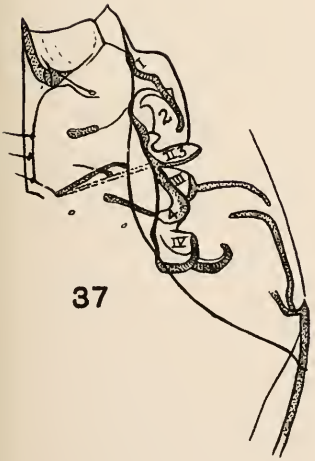

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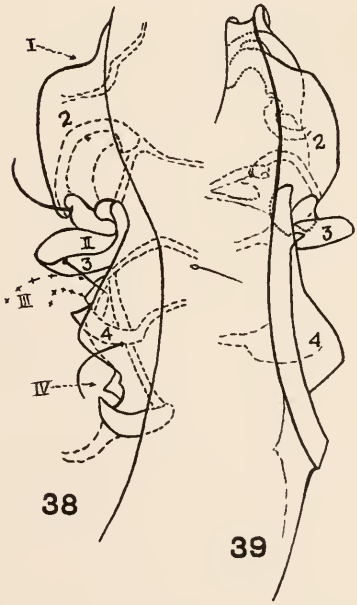

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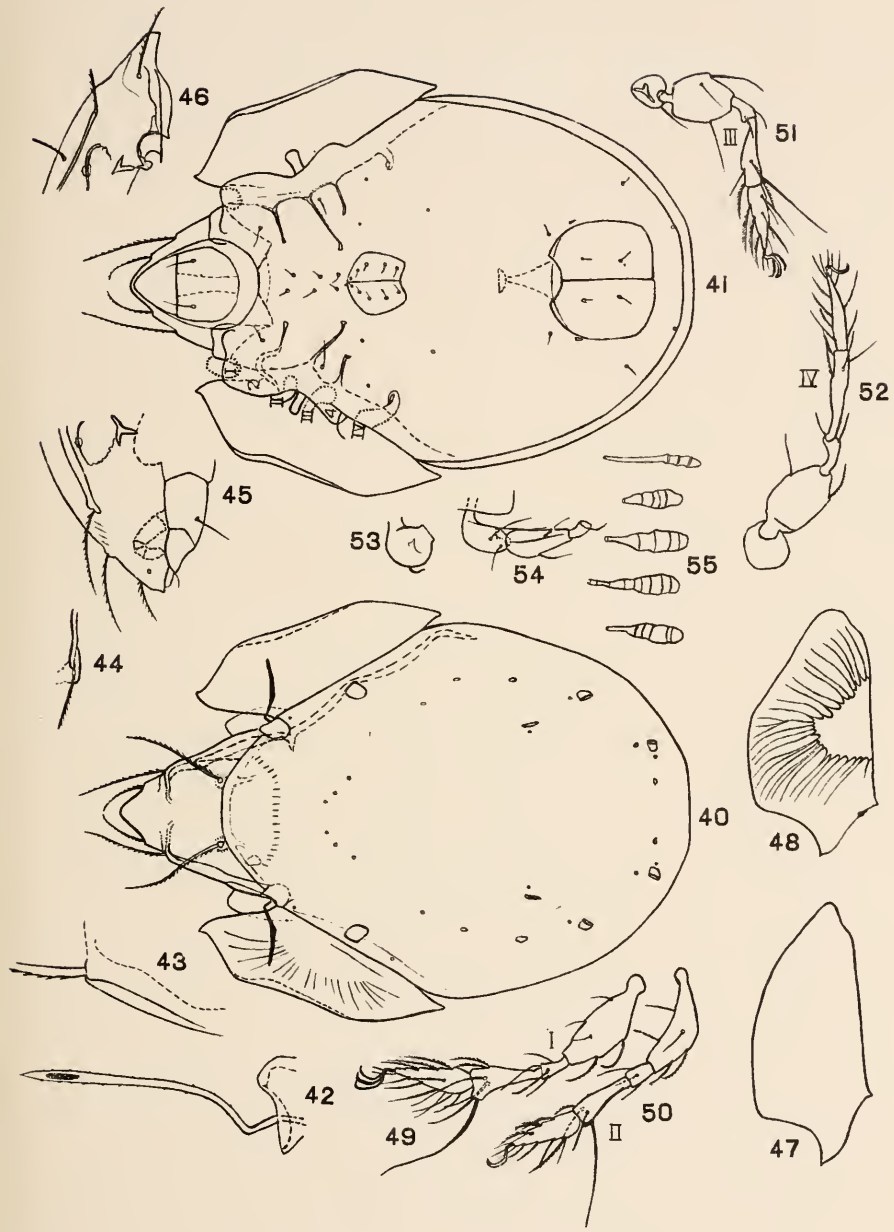
PLATE 6

PLATE 6

Parakalumma lydia (Jacot) 1923

Fig. 40. Dorsal view; ratio 100.
Fig. 41. Ventral view; ratio 100.
Fig. 42. Pseudostigmatic organ somewhat foreshortened; ratio 440.
Fig. 43. Right lamella from above; ratio 440.
Fig. 44. Right lamella seen at right angle; ratio 100.
Fig. 45. Anterior end of cephaloprothorax from left side; viewed obliquely from below and somewhat behind; without nearer rostral bristle; ratio 100.
Fig. 46. Anterior end of cephaloprothorax from right side; viewed more from above and somewhat in front; ratio 100.
Fig. 47. Outline of pteromorpha viewed at right angle; ratio 100.
Fig. 48. Pteromorpha viewed more from below; ratio 100.
Fig. 49. Leg I, inner aspect; ratio 100.
Fig. 50. Leg II, outer aspect; ratio 100.
Fig. 51. Leg III, inner aspect; ratio 100.
Fig. 52. Leg IV, outer aspect; ratio 100.
Fig. 53. Coxa IV; ratio 100.
Fig. 54. Coxa, femur and genual, ventral aspect; ratio 100.
Fig. 55. Fungus spores, often found on body and in leg cupboards; ratio 440.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Bulletin of the Museum of Comparative Zoölogy
AT HARVARD COLLEGE.
VOL. LXIX. No. 2.

71,996

A RARE BRAMID FISH (TARACTES PRINCEPS JOHNSON) IN THE NORTHWESTERN ATLANTIC

BY HENRY B. BIGELOW AND W. C. SCHROEDER.

WITH ONE PLATE.

CAMBRIDGE, MASS., U. S. A.:
PRINTED FOR THE MUSEUM
FEBRUARY, 1929.

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OF THE

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Vol. LXIX. No. 2.

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February, 1929.

No. 2.— *A Rare Bramid Fish (Taractes princeps Johnson) in the Northwestern Atlantic*

By Henry B. Bigelow and W. C. Schroeder

On January 10, 1928, the crew of the fishing schooner *Wanderer*, line trawling on Browns Bank about 50 miles southwest of Cape Sable, N.S., landed a strange fish. The specimen, now in the Museum of Comparative Zoölogy, proved to be a Bramid, agreeing down to minute details with Johnson's (1863) description of *Brama princeps*. The opportunity to redescribe this old species is especially welcome because its status has been somewhat problematical, it having been referred by Smitt (1892, p. 80) to the synonymy of the allied, but apparently quite distinct, *Brama longipinnis*, and because no illustration of it has previously appeared.

Bramids have repeatedly been reported, from different seas, since Brama was first described by Willoughby (1686, appendix p. 17 and plate V 12) more than 200 years ago, and a considerable number of forms have been named. But the study of the family Bramidae has been made difficult by the fact that these fishes show great changes in the outline of the body, and in the fins, with growth, so that the young differ greatly from the adults in appearance. Their deep-water habitat has also militated against ready understanding of their interrelationships, because most of the specific names that have been proposed for the members of this family have been based on so few specimens that it is impossible to estimate the normal range of variation for any of these forms, except for the one common *Brama raii*.

Our material does not warrant any attempt at general revision of the family: large series of the various named forms and from different seas will be required for this. But a brief discussion of the genera which have recently been recognized within the family, and of those species of Taractes that are the most nearly related to *Taractes princeps*, may be of interest.

It has long been recognized that the family *Bramidae* falls into two easily separable groups, the one characterized by a large number of scales (80–90) along the lateral line, the other with a much smaller number of scales (40–60). The first of these subdivisions is typified by

the well-known *Brama raii* (Bloch) Bloch and Schneider, and the following named forms also fall here:

Brama chilensis Gay
Brama australis Valenciennes
Brama squamosa Hutton
Brama japonica Hilgendorf

The first three of these were provisionally referred to the synonymy of *B. raii* by Lütken (1880), and no doubt justly. *B. japonica* has a slightly better claim for recognition; but whether it really deserves specific rank is yet to be determined. It is probable also that the *Brama agassizii* of Poey falls here, for although neither Poey's (1860) published description, nor tracings of his original drawing contributed by Dr. Carlos de la Torre throw any light on the number of scales, yet it agrees very closely with *Brama raii* in general appearance. These need not be discussed further here, for our specimen belongs to the other (few-scaled) division.

Within this group recent authors have recognized three separate genera: Eumegistus, Collybus, Taractes. Among these Eumegistus is set apart by the possession of a well-marked lateral line, and by the smooth-edged scales, these being the generic characters given by Jordan and Jordan (1923), its proposers. These characters seem sufficient for generic rank, for among other few-scaled Bramids the lateral line, so far as known, is either entirely obsolete, or at most it is so faintly marked that it is discernible with difficulty, while the scales are more or less emarginate. Up to the present time only one species of Eumegistus has been described, its type *E. illustris*, Jordan and Jordan (1923) from Honolulu. We have not seen this species.

The status of the genus Collybus, proposed in 1904 by Snyder, is not so clear. He believed it to differ from Taractes "in not having teeth on the vomer and palatine bones, and having the caudal deeply cleft, the ventrals inserted posterior to the middle of the bases of the pectorals, and in not having the opercular bones denticulated." Unfortunately neither the details of the teeth, the outline of the caudal, nor the degrees of denticulation of the opercular bones seem sufficiently stable to serve as generic characters, unless they be correlated with other features. Thus, Smitt (1892, p. 75) has pointed out that in the closely allied genus Brama the vomerine teeth are decidedly variable, for not only do they often disappear in old specimens, but they are sometimes lacking even in young ones. Still less weight can be given to the precise degree of emargination of the caudal fin, for in some of the species of

Taractes it is likewise deeply emarginate, while it is not more deeply cleft in Snyder's figure of *Collybus drachme* (1904, pl. 9, fig. 16), a young specimen only 81 mm. long, than it is in young *Brama raii* of corresponding size (Lutken, 1880, pl. 4, fig. 1 and 2).

It is doubtful whether the denticulation of the opercular bones is of more than specific value in this group, for according to Smitt the preoperculum, denticulate at the margin in the young, loses this character in the adult, while various degrees of fringing and denticulation have also been described by other authors among the Eumegistus-Taractes group. The location of the ventral fins relative to the pectoral may be more reliable. In *Brama raii* the ventral has been described as originating under the posterior base of the pectoral fin, and this is its position in one excellent specimen of this species, for which we have to thank the British Museum. Among the various named forms with few scales, other than Snyder's *Collybus drachme*, the ventral either originates very slightly in front of the anterior base of the pectoral, or below that fin. But in a group which shows such great changes in general form with growth it seems hardly safe to use a slight difference in the relative positions of the origins of these two fins as a generic character, if based only upon a young specimen. It is true that Jordan and Jordan also mention a large cast of *Collybus drachme* in the Bishop Museum in Honolulu, but no details are given as to this character. On the whole, then, considering the small size of Snyder's specimen of Collybus we doubt whether the genus deserves recognition.

This elimination leaves in the genus Taractes all Bramids with few and emarginate scales, without lateral lines and with the ventrals originating either under or in front of the pectorals. The named "species" covered by this diagnosis are: *Taractes asper* Lowe; *Brama longipinnis* Lowe; *B. saussuri* Lunel; *B. princeps* Johnson; *B. raschii* Esmark; *Argo steindachneri* Doderlein. A tracing, by Dr. Carlos de la Torre, of Poey's unpublished drawing of *Brama brevoortii* Poey, also locates this species here, showing large scales. Unfortunately, however, for the taxonomist, we here encounter a nomenclatural puzzle. The genus Taractes was instituted by Lowe (1843) for a juvenile Bramid from Madeira which he described as *T. asper*. The distinctive characters he gave only as forty-three rows of scales, scales provided with hooks or spines, operculum denticulated, teeth on vomer as well as palatine, and caudal rounded. Subsequent studies of the genus Brama have shown, however, that the hooks or spines on the scales are a juvenile character, lost at least in some members of the group with advanced age. The variability of the degree of denticulation of the oper-

culum we have just touched on; and, as we shall see, the precise outline of the caudal is best considered a specific character, not a generic one. This leaves as distinctive of the genus Taractes, only the small number of scales. And on the preceding page of the same publication Lowe described a large Bramid (*Brama longipinnis*), with few scales (41–45), from the same locality. Subsequent authors, Jordan and Evermann (1896, p. 957), Jordan, Tanaka and Snyder (1913, p. 134) have concluded that *Taractes asper* was simply a young stage of Lowe's *Brama longipinnis*.

This, however, implies that the tail, rounded when young, becomes lunate with growth. But a change of this order seems unlikely because the young *Brama raii*, like the adult, has an emarginate caudal. Until more material of different sizes can be studied it therefore seems wisest to retain both *longipinnis* and *asper* as distinct species.

Taractes saussuri and *T. brevoortii* are sharply marked off from all other known members of the genus Taractes by the outline of the caudal, which is double concave, its median rays longer than those flanking them, and as long as the marginal rays (in *saussuri*), or only slightly shorter (in *brevoortii*), so they need not be considered further here.

Taractes longipinnis, *T. princeps*, *T. raschii*, and *T. steindachneri* agree in having the caudal lunate and are otherwise closely allied. Smitt (1892) has, in fact, definitely referred *raschii* to the synonymy of *longipinnis;* while Steindachner and Doderlein (1884, p. 6) have made this same disposition of *steindachneri*. However this may be, Smitt's similar union of *princeps* with *longipinnis* seems not to have been warranted, because Johnson's (1863, p. 36) original and very detailed account of the former describes the outer parts of the rays of the posterior portions of the anal and dorsal fins as free from the membrane, a conformation which does not appear in the published accounts or illustrations of any other Taractes. Johnson also describes transverse pits on the caudal peduncle above and below, near the base of the fin, structures which have not been recorded on any other Bramid but which are well marked on our specimen, as described below (p. 43). And the fact that our fish agrees with Johnson's account in both these respects establishes its identity with Johnson's original specimen of *princeps*.

It must be recognized that in the case of species as closely allied as are the representatives of Taractes, and for which the range of variability is still to be learned, examination of large series of specimens of various sizes and from different localities may finally lead to unions or to separations that would not be warranted by the published accounts

alone. At present, however, it seems wisest to retain *princeps* as a separate species distinguishable from other members of its genus by the following combination of characters:

1. Very deeply lunate tail.
2. The fact that the low rays of the anal and dorsal fins are distally free from the membrane for about a third of their length.
3. Great length of the anterior dorsal and anal rays.
4. Scales smooth, without hooks or spines (at least in adult).
5. Caudal pits present.

TARACTES PRINCEPS (Johnson)

Cat. No. M.C.Z. 31598

Dorsal III, 32; anal II, 26; ventral I, 5; pectoral 20; caudal 24. Scales 43 in longitudinal series, counting along the mid-line to last large scale at base of caudal; 15 above and 11 below the median series. Lateral line absent.

Body deep, compressed, massive, 1.9 in standard length; outline rhomboidal. Anterior profile strongly convex; ventral outline, posterior to head, somewhat more convex than dorsal outline. Mouth oblique; lower jaw enters anterior profile. Maxillary extends to middle of eye. Eye large, oval, its horizontal diameter 4.9 in head. Two pairs of nostrils, the anterior one with an opening nearly round, 29 mm. in front of eye, in line with upper edge of premaxillary; posterior nostril a slit, 11 mm. long, about 10 mm. in front of eye, and situated a little lower than the anterior nostril. Interorbital very strongly convex, its width 2.5 in head. A distinct transverse caudal pit present above and one below, close to base of fin.

Origin of dorsal over posterior end of axil of pectoral; elevated anteriorly, outline deeply falcate; the elevated part concave behind; the fourth and fifth rays the highest, 1.15 in head, after which they rapidly shorten to the 15th ray; posterior rays about equal in length. The short rays of dorsal united by a membrane along the lower two-thirds, but outer one-third free, so that distal part of rays appear detached like finlets.

Anal similar to dorsal, its origin about opposite first short rays of dorsal, the first to fourth rays the longest, 1.14 in head.

Ventrals thoracic, origin under anterior end of base of pectoral; relatively short, 4.65 in head; inner part of fin attached to body by a series of membranes forming four pockets, above which are several elongate scales forming a flap nearly as long as fin. Distance between origin of ventral and origin of anal 4.2 in standard length.

Pectorals long, 2.6 in standard length, rather slender, the upper margin nearly straight except distally where it bends downward; lower margin nearly straight, the edge now somewhat frayed; origin of pectoral in advance of origin of dorsal, but directly opposite origin of ventrals, its tip extending back to about the twenty-fifth dorsal ray. Margin of caudal lunate, the lobes long, slender, the upper lobe slightly the longer.

Scales without ridges or spines, varying greatly in size, smallest along anterior back, largest along side and below. Posterior margin of scales irregular, concave, convex, notched or straight. The large scales along sides with an elongate process at each end of base, the total length of base on one scale examined being 66 mm. Scales present everywhere on body, also on head, except for mandible, margins of opercle and preopercle, premaxillary, extreme posterior margin of maxillary, and a naked area on snout extending to above upper margin of eye.

Base of dorsal rays with small scales arranged in irregular series; each of the longest rays with one row of scales extending nearly to end of ray, the scales so arranged that they are telescopic when fin is deflexed; low rays scaled nearly to outer edge of connecting membrane; these scales not as regularly arranged as in *Brama raii;* free ends of rays naked. Anal scaled like dorsal. Caudal with numerous small scales extending everywhere on black part of fin, except the outer edges which are naked; white concave margin is mostly without scales. Scales extend into caudal pits. Base of pectorals with scales, a small patch of elongate scales extending on rays on the outer side; scales in armpit excessively long. Lower part of ventrals scaled.

Teeth cardiform, alike in both jaws, small, sharp, conical, arranged irregularly, in several rows; no large tooth on each side of symphysis in lower jaw; some of outer teeth directed slightly inward, the inner teeth still more so; all of about the same size, except teeth of innermost row of lower jaw, which are slightly larger than the rest. Teeth on palatines but none on vomer.

All gill arches, except the first on the right side, had been removed from the specimen when it was cleaned by the fishermen. Gill rakers elongate, the longest 17 mm.; 7 rakers, decreasing in size, on lower limb of arch, followed by 7 rudiments; 2 rakers and some rudiments, on upper part of arch. Each gill-raker, including rudiments, with a patch of small sharp teeth. A series of small toothed protuberances, of which about one is opposite each raker, is situated along inner side of gill arch. Pseudobranchiæ present.

Color in fresh condition, about seventy-two hours after death: body

and head blackish, tinged with pale salmon on opercles and along sides; dorsal and anal dusky, the free ends of short rays pale; caudal black, the concave margin white; pectorals mostly pale.

Measurements as follows:

Length from snout to end of upper caudal lobe	830 mm.
Length to end of mid-caudal rays	670
Length to last vertebra (standard length)	618
Depth	322
Head	200
Snout	63
Eye, horizontal axis	41
Eye, vertical axis	52
Interorbital	80
Least depth of caudal peduncle	46
Length of upper caudal lobe	254
Length of lower caudal lobe	246
Length of pectoral	236
Length of ventral	43
Ventral origin to anal origin	147
Height of dorsal	174
Height of anal	175
Length of premaxillary	91

Geographic Distribution

Most of the Bramids live in deep water of one hundred fathoms or more, and probably because of this, and of an active habit, they are seldom captured. In a few localities, however, they are taken in sufficient numbers to appear occasionally in the markets, and have acquired common names. From time to time, for example, *Brama raii* is to be seen in the markets along the Pacific Coast of North America from California to Oregon; also in Japan and in the Mediterranean, while now and then some numbers of these fish are caught around the British Isles. As a recent example of this we might cite an unusual run of *B. raii* in the North Sea, in the English Channel, and along the coast of Great Britain (Ehrenbaum, 1928).

B. raii has also been recorded from Woods Hole, Mass. (Sumner, Osburn and Cole, 1913), from the Grand Banks and from Bermuda (Goode and Bean 1896), and Poey (1860) described *B. agassizii* (probably equals *B. raii*) and *Taractes brevoortii* from Cuban waters, where they are known to the fisherman as Catalufa de lo alto, while Lunel's

(1865) *B. saussuri* came from that same region. But so far as we can learn, there is no other record of any Bramid having been taken along the Continental Shelf of North America except on the Grand Banks. The present specimen, therefore, is of geographic as well as taxonomic interest.

Evidently the normal habitat of *T. princeps* does not include any of the fishing grounds in the western Atlantic, else specimens of so noticeable and so large a fish would have been reported long before this. As it was caught on a baited hook and was in good condition, it evidently was not disabled at the time, although it may have strayed into an unfavorable environment. The greatest depth on Browns Bank proper being only about fifty fathoms, the specimen was taken not deeper than that. The only previous record of *princeps* (Johnson's 1863) was for adult specimens of 27–33 inches, taken in February and March at Madeira, where he describes the fish as common enough to have received a vernacular name.

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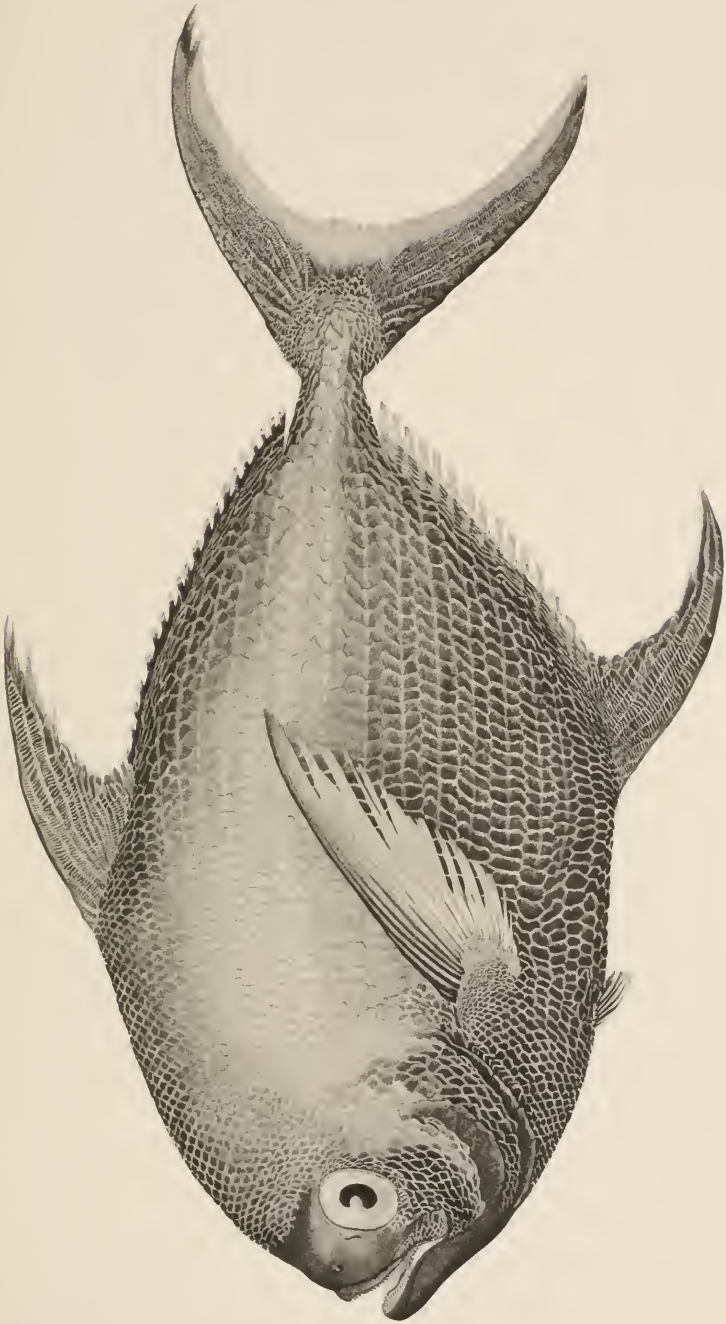

H. Saunders del.

Bulletin of the Museum of Comparative Zoölogy
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SPIDERS FROM PANAMA.

BY NATHAN BANKS.

WITH FOUR PLATES.

CAMBRIDGE, MASS., U. S. A.:
PRINTED FOR THE MUSEUM.
FEBRUARY, 1929.

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February, 1929.

No. 3.— *Spiders from Panama*

By Nathan Banks

Through the kindness of Dr. Thomas Barbour and in company with Dr. W. M. Wheeler, I spent about two months during 1924 in Panama. From about the middle of June to near the middle of August we divided our time between the island of Barro Colorado, the vicinity of Panama City, and points along the Panama railroad. Thus all the collecting was done in the low land of the country. The island of Barro Colorado presents primitive forest conditions, while elsewhere the collecting was in more open country. From the evidence of the spiders collected it is plain that the fauna is closely related to that of South America, rather than to that of the general Central American fauna. Dr. Petrunkevitch, with material from higher regions of Panama, reached just the opposite conclusions. The affinity with South America is especially distinct when viewing the spiders of Barro Colorado. A number of South American species were found here which were unknown or rare in Central America. One of the most common Acrosomas was *A. schreibersi*, a species common in South America, but previously noted from Central America only in one coast locality.

It is also evident that the Pacific side shows the greater relation to the Central American fauna, while the Atlantic side contained the greater number of South American forms. There are often differences in localities but a few miles apart. As, for example, on Barro Colorado one of the most common Leucauge was *L. mandibulata*, not found elsewhere, while across the lake at Frijoles the common Leucauge was *L. argyra*, not found on Barro Colorado, but taken elsewhere along the canal.

I have included in the list a few species taken by Dr. Wheeler on a previous trip, some obtained by Dr. Barbour, some received from Mr. Shropshire, and a few from other collectors, but especially from Dr. C. L. Dodge in 1925. In the spring of 1924 Professor Allee of Chicago collected on Barro Colorado, and these spiders were studied and described by Dr. Chamberlin in 1925. I have included these in this report, mostly as synonyms, but I have not found the type of one of the species. Altogether in this list are 241 species in 26 families; 30 species are considered new.

A number of other specimens are unplaced, particularly in the Attidae near the genera *Freya* and *Phyale;* specimens of one sex can

hardly be identified from descriptions or figures of the opposite sex; likewise males of *Epeira* were often left unplaced. Besides these there are a number of spiders recorded from Panama in the Biologia, in Petrunkevitch's recent paper, and some Attidae described by Peckham. The arrangement of families adopted is partly that of Thorell, modified to show the increasing complexity of the male palpus. Thus the Attidae are placed after the Clubionidae and the web-making forms at the end.

The Pholcidae have a fairly complicated palpal organ, but it is very different from others, and the general structure of the body and legs is more nearly like Scytodidae than like Theridiidae.

From Barro Colorado are recorded 172 species.

Of the localities, Barro Colorado, Frijoles, Ft. Sherman, Ft. Davis, Mt. Hope, Gamboa, Red Tank, and Ancon are in the Canal Zone; the other localities are in the Panama Republic.

THERAPHOSIDAE

Sericopelma rubronitens Auss.

San Pablo (Lesley coll.), Aspinwall, Ft. Sherman, February; Corozal (Capt. Stuart), Ancon, March-April (Zetek, Barbour and Brooks); and Barro Colorado (Allee). Evidently this is the most common tarantula in the region. *S. communis* Cb. is the same species.

Ischnothele guianensis Walck.

One from Barro Colorado, July 13.

Pachylomerus rugosus Karsch

One from Ft. San Lorenzo, Zetek collection, agrees well with the description of the Costa Rica type.

FILISTATIDAE

Filistata hibernalis Htz.

One from Corozal (J. B. Shropshire).

DYSDERIDAE

Ariadna comata Cb.

Bella Vista, July, nests in holes in bark of large trees.

OONOPIDAE

Dysderina plena Cb.

Barro Colorado, 16 July; young male from Mt. Hope, 8 July, is probably the same.

CAPONIDAE

Nops maculata Sim.

One from Barro Colorado, 20–24 June.

ZODARIIDAE

Storena barroana Chamb.

One from Barro Colorado, 13 July, described from the island under the name of *Naibena;* if a special genus is necessary for the Central American forms *Tencdos* is available.

PALPIMANIDAE

Otiothops macleayi sp. nov.

Figs. 26, 42

Cephalothorax uniform dark red-brown, abdomen dark gray brown, front legs clear red-brown, other legs pale yellowish, sternum and basal plate of venter red-brown. Cephalothorax with many fine appressed hairs, and in front near eyes with longer erect ones. A.M.E. much the largest, not one-half their diameter apart, A.S.E. larger than P.S.E., situated about their long diameter apart and twice as far behind the A.M.E. Legs densely clothed with fine hair, forming a brown fringe on the inner side of the front tibia, metatarsus, and base of tarsus, and tufts of dark brown hair at the tips of all other tibiae; no spines on the legs; front patella plainly longer than tibia. Sternum with large granules all over surface, but those on middle smaller; mandibles with granules in front, palpi fringed on outer tip with black bristles; basal plate of venter rather truncate behind.

Length 6.5 mm.

A female from Barro Colorado Island, Canal Zone, 20–24 June. Separated from the Venezuelan species by the more widely separated posterior median eyes.

SCYTODIDAE

Scytodes longipes Lucas

Common. Barro Colorado, 20–24 June, 14–29 July; Taboga Island, 29 June.

Scytodes championi Cb.

Barro Colorado, 20–24 June, 14–20 July, 2 August; Ft. Davis, 5 July.

Scytodes guttipes Simon (?)

Two from Barro Colorado, 25 June, appear to be this species described from Venezuela, but may be different.

Loxosceles rufipes Lucas

Barro Colorado, 20–24 June, 23 July; Bella Vista, 8 August. Also from Prof. Allee on Barro Colorado.

PHOLCIDAE

Metagonia caudata Cb.

Several from Barro Colorado, 20–24 June, 18 July.

Modisimus maculatipes Cb.

Common, Barro Colorado, June, July, underside of large fallen leaves on the ground.

Modisimus pulchellus sp. nov.

Figs. 16, 21, 68

Cephalothorax yellowish; faint dark marks each side of middle, and a dark spot back of the eye-tubercle, latter with pale line in the middle; legs dull greenish yellow to brownish, darker bands near tips of femora and tibiae (not always distinct). Abdomen pale, with blackish or bluish black spots above, arranged so as to leave a pale median stripe, also dark marks on the sides, and one in the middle of the venter.

The small median eyes are not present; on the male mandibles in front are several minute teeth near base of the fang and one higher up toward the middle. The male palpus has the spur on the femur sharp-pointed, the long tarsal process is simple at tip, but thicker toward base, without a spur; the tube at tip of bulb has an inner tooth. The

epigynum shows a broad dark area, with an oblique ridge each side, connected at base.

Length ♀ 2.5 mm., ♂ 2.8 mm., femur I of male 8 mm. Canal Zone, Barro Colorado, 18–29 July, and August.

Blechroscelis modesta sp. nov.

Figs. 24, 39, 41, 80

Cephalothorax pale yellowish, unmarked, except black around each group of eyes; abdomen pale gray, with a faint black mark each side just before the spinnerets; legs pale, in the female, with a dark band just before tips of femora and tibiae, the extreme tip paler. Cephalothorax with short hair above, sternum with much longer hair; abdomen more hairy, those below the longer; legs with fine hair, those near tip of femora of male more bristly. Eyes forming two groups with the small A.M.E. between the A.S.E., the posterior eye-row plainly procurved. Mandibles of male with two little teeth each side just above the base of the fang. Abdomen plainly longer than cephalothorax, moderately convex above; vulva showing two circular openings about diameter apart. Male palpus has a slender spur-like process on the inner side near tip of femur, the tarsus is produced into a long, slender, evenly curved, tapering, spine-like process.

Length 2 mm., femur I♂ 6.5 mm., ♀ 4.5 mm.

Canal Zone, Barro Colorado, 20–24 June, 13 July; Ft. Davis, 3 July. *B. annulipes* Keys from Colombia is very much larger, and the shape of abdomen would seem to place it in *Coryssocnemis*.

DRASSIDAE

Echemus iotus sp. nov.

Fig. 58

♀ Pale yellowish throughout, a small black spot over the A.M.E. Eyes subequal in size, the P.M.E. elliptical and oblique, at less than their short diameter apart, the P.S.E. slightly angular on inner side; A.M.E. about their diameter apart; the S.E. nearly touching; both rows procurved. Abdomen truncate at base, flattened, near spinnerets slightly reticulately darkened. Legs moderately long, each femur with two long spines above and two or three (hind legs) shorter ones near tip, tibiae I and II with a pair beyond middle and one at tip, these metatarsi with a subbasal pair; hind tibiae with 1, 1, 2 below, two each side and one above near base, hind metatarsi with four or five near base and

two or three at tip. Vulva with a broad median plate, narrowed in front, and two circular cavities close together behind it.

Length 4.2 mm.; cephalothorax 1.8 mm.

Panama, Las Sabanas, 7 July.

A female, possibly not quite mature, from Barro Colorado has a longer abdomen, the cavities behind the plate of vulva more separated, and the front tibia has 1, 1, 1 spines beneath.

Cesonia cincta sp. nov.

Fig. 79

♀ Black; cephalothorax a shining black, with some white hairs; abdomen a dull or greenish black with a narrow median white band, and traces of a white band at extreme base. Femora shining black, front legs partly pale on patella, and pale from near base of tibia out; patellae of third and fourth legs mostly very pale, the tibiae darker, metatarsi blackish, the tarsi pale; coxae III and IV also very pale; sternum blackish, scarcely paler in middle, tips of maxillae pale. Cephalothorax narrow in front, a distinct dorsal groove; eye-rows rather far apart, hind eye-row just noticeably recurved, and a little broader than front row; P.M.E. smaller than P.S.E., slightly oblique, fully two diameters apart, a little closer to P.S.E., quadrangle of M.E. much longer than broad, front eye-row straight, A.S.E. larger than A.M.E. Mandibles rather small, with long bristles in front, no teeth on hind margin. All legs hairy, especially long on femora below; front legs short, femora thickened, with two long spines above, tibia with 1, 1 spine below, these metatarsi and tarsi scopulate; hind femur with two spines above, the tibia and metatarsus with a number of spines.

Length 6.2 mm.; cephalothorax 2.7 mm.

Adult from Las Sabanas, Panama, 7 July, another (rather smaller) from Ancon, March (Wheeler); young from Barro Colorado.

CLUBIONIDAE

Corinninae

Corinna mucronata Cb.

Barro Colorado, 16 July; Ft. Sherman, 3 July.

Corinna bulbosa Cb.

The *C. cutypa* of Chamberlin from Barro Colorado is this species, the abdomen of the type is somewhat discolored; Petrunkevitch has

also recorded and described it from Panama, San Lorenzo, and there is a young specimen from this place in the Chamberlin collection.

Trachelas barroanus Chamb.

Described from the island; also taken there 18 July. Close to *T. truncatulus* Cb., except that I fail to see the three points at the tip of the palpal bulb. However, I doubt if these are always constant, and if the cusps on the legs are variable, then both fall to *T. bispinosus*.

Micarinae

Castianeira lachrymosa Cb.

Barro Colorado, 10 to 26 July.

Castianeira luctuosa Cb.

Figs. 52, 71

A female from Almirante, March (J. D. Smith). The cephalothorax is not as slender behind as in *C. memnonia;* the abdomen is broader behind, the basal dorsal shield is broader, and the legs shorter, especially the front pair.

Castianeira memnonia Koch

Figs. 11, 50, 64

Several specimens of both sexes from Barro Colorado, 14–29 July. The femora are mostly black, but near tip partly pale, rest of front legs pale, but some dark at base of tibia; hind legs largely dark, but pale on patella and tarsus; coxae pale. Eyes close together, the quadrangle of M.E. scarcely broader behind, the P.M.E., about one and a half diameter apart, closer to P.S.E. On the abdomen there is a tendency to form a white band at the constriction, especially on sides and venter. In the female the basal shield is more than twice as long as broad, slightly tapering behind, in the male it is broader and reaches nearly to the constriction. The tibia of I and II has three pairs of spines below, the last pair at apical third, these metatarsi with two pairs below; hind tibia with median and preapical pairs of spines below, hind metatarsi plainly longer than tibiae, with two pairs of spines below (toward tip) and two each side. The male palpi are short, the femur of the female palpus has four erect bristles in a row on front side. The vulva is dark and rather obscure, but apparently a cavity near each posterior corner.

Mazax spinosa Cb.

Common on ground, Barro Colorado, June and July; Mt. Hope, 8 July.

Specimens agree generally with the description; details of color differ somewhat, none of the specimens have tibia IV banded near base; there are white hairs on the cephalothorax, marks on sides of the abdomen, and in some specimens one or even two transverse pale bars on dorsum toward tip. All have the two spines at the base of the abdominal shield. The main reason for it possibly being different is that all the hind femora have a prominent long spine near base on a slight elevation; Cambridge says nothing of this, but the spines might have been broken off of his specimen.

Mazax segregata Chamb.

Described from Barro Colorado.

Probably equals *M. plana* Cb.; the difference in eyes cited is very slight, the spines on the tibia might well vary from five to six. The vulva in his type shows the white hairs each side as Cambridge mentions.

Myrmecotypus cinctus sp. nov.

Fig. 56

Cephalothorax yellow-brown, darker on sides; legs pale, femora scarcely embrowned, hind pairs with dark streak on each side, hind tibia and metatarsi dark, the patella and tarsi, however, very pale. Abdomen brown, a broad pale band before middle; sternum dark yellow-brown; venter brown. Cephalothorax nearly twice as broad in the middle as in front; posterior eye-row but little broader than anterior eye-row, both nearly straight, the eyes rather large, the A.M.E. little larger than the A.S.E. and hardly as large as posterior eyes, P.M.E. scarcely diameter apart, much closer to the equal P.S.E. Legs of moderate length, front tarsus about three-fourths of the tibia; femora with two or three spines above, the longest one near base, front tibia with three pairs below, metatarsus with two pairs; hind tibia and metatarsus with two pairs below, the tibia with two lateral and one dorsal toward tip. Fang-groove with two little teeth behind; maxillae long, truncate at tip, outer side straight; sternum but little longer than broad. Abdomen much longer than the cephalothorax, not twice as long as broad, female with a small basal, dorsal shield reaching back

almost to the pale band, at base of the shield are two tiny bristles. The vulva shows two reddish openings in a corneous plate, about a diameter apart.

Length 3.5 mm.

One from Mt. Hope, Canal Zone, 8 July.

Myrmecotypus similis sp. nov.

Fig. 70

Cephalothorax uniform dark red-brown, with some appressed white hair; palpi almost black; legs whitish, but much marked with dark, front and hind femora almost wholly dark brown, second and third femora with dark streaks, front tibia with dark line each side and one above, metatarsus and base of tarsus dark brown, rest of tarsus very pale, second tibia with similar dark lines, metatarsus rather darkened, third tibia slightly darkened and with three dark lines, metatarsus and tarsus both darkened, fourth tibia, metatarsus, and tarsus darkened, but the basal part of the metatarsus is clothed with white hair. Sternum dark brown; coxae (except part of hind coxae) pale. Abdomen black above and below, venter with a curved white mark on each side before the middle, dorsum with appressed greenish and white pubescence, the white forming some median spots toward base and near tip but hardly bands; near tip the abdomen has much long, pale hair. Cephalothorax fully two and one-half times as long as broad; both eye-rows about straight, the posterior eye-row scarcely longer than the anterior one, A.M.E. rather larger than the other eyes, the A.S.E. about equal the posterior eyes, quadrangle of M.E. rather higher than broad, P.M.E. fully two diameters apart, and only one-half so far from the equal P.S.E. Femora with two or three spines above, basal one longest, front tibia with three pairs below, also with lateral and dorsal spines. Front tarsi short, not two-thirds of the metatarsi; sternum more than twice as long as broad. Maxillae long and straight outside, tip truncate. Abdomen slender, over three times as long as broad, constricted from above before middle, a basal dorsal shield reaching about one-third way back, abdomen distinctly pedicelled at base.

Length 9 mm.

One female from Barro Colorado, 24 June.

Related to *Macaria salticina* Taez., and with it should form a separate genus or subgenus. Elongate form like *Castiancira,* but the eyes ally it to *Myrmecotypus.*

Clubioninae

Clubiona sericea Cb.

Common, Barro Colorado, 20–24 June, 10–18 July, 2 August.

Chiracanthium ferum Cb.

Gamboa, 7 July; Colon, 16 August.

Eutichurus sp.

Fig. 77

Barro Colorado, 4 August. One female; it is pale, with two brown stripes on the cephalothorax. It is doubtless the female of one of the four species described from Colombia, but all based on males.

Anyphaeninae

Sillus longispinus Cb.

Barro Colorado, 20–24 July.

Teudis roseus Cb.

Ancon, 23 March (W. M. Wheeler), on *Cordia*.

Aysha simplex Cb.

One male from Taboga Island, 29 June.

Aysha similaris sp. nov.

Fig. 75

♀ Cephalothorax pale brownish yellow, rather darker in front; mandibles red-brown; sternum pale; abdomen pale yellowish, above with two reddish stripes from base to tip, toward tip with a few reddish dots between stripes and near sides; venter pale, a reddish mark near spinnerets and a patch of short black hair a little behind vulva on the spiracular furrow; legs pale, marked with reddish at base and tip of tibia and metatarsi, especially noticeable on the hind legs, femora slightly reddish toward tip, especially on the front pairs. Legs and body with long white hair. Eyes subequal, anterior eye-row straight, A.M.E. about one-half diameter apart, rather closer to A.S.E.; posterior eye-row slightly procurved, P.M.E. about one and a half diameter apart and almost as far from the P.S.E. Mandibles large, divergent, and slightly porrect. Tibiae I and II with three pairs of spines

below, two on each side, these metatarsi with a sub-basal pair of spines only; hind tibiae with three pairs below, two above, and three each side. Vulva similar to that of *A. gracilis* Htz. but the median process does not reach so far forward.

Length 10–12 mm.; cephalothorax 4–4.5 mm.

Canal Zone, Barro Colorado, 17–29 July.

Wulfila mandibulata Petrunk.

Figs. 7, 12, 14, 27

One male from Mt. Hope, 8 July.

Described by Petrunkevitch as a *Cragus*, but that genus has many more spines on the legs; ten or more spines beneath metatarsi I and II, while according to Petrunkevitch's own description this has but two pairs. He notices the fringe of black hairs near posterior end of cephalothorax, an unusual character. Two or three of the largest and longest hairs on the front of the mandibles arise just above the fang and are curved and somewhat parallel to the fang.

Wulfila is best separated from *Teudis* and *Sillus* by the much more slender legs, as well as the smaller size. It is doubtful if the slight difference in the number of tibial spines will hold when more species are known.

ATTIDAE

Attinae

Marpissini

Marpissa magna Peckh.

Barro Colorado, 20–24 June.

Menemerus bivittatus Duf.

Colon, 17 June, Gamboa, 9 July.

Deza sumptuosa Perty.

Barro Colorado, 20–24 June; one specimen of this handsome spider, previously known only from South America.

Fuentes punctatus Peckh.

One female from Las Sabanas, 7 July. It agrees with Peckham's type, which was described as a *Balmaceda*. The vulva is practically the same as in *Metacyrba taeniola* but the abdominal markings readily

separate it. *F. punctatus* has but two little spines under tibia I, these near tip. The type of *Balmaceda* was taken by Peckham as *B. picta;* this type (which is here) has three pairs of well-developed spines under tibia I, and the front legs are not nearly as swollen, it will go close to *Maevia* (probably the same). It has a fissidentate tooth on the mandible.

The type of *Fuentes* is *pertinax*. The type has but two little spines under tibia I, the mandible one minute tooth, the vulva is similar to that of *F. punctatus*. *Metacyrba taeniola* from the United States agrees also in the tibial spines, the tooth on mandible, and the vulva. The three should go into one genus, *Fuentes*, as follows:—

pertinax (*Fuentes*)
punctatus (*Balmaceda*)
taeniola (*Metacyrba*)

Fuentes lineatus from the United States has three pairs of spines under tibia I and so is not a *Fuentes; Onandaga* Peckh. can be used for it, if it is not lumped into *Maevia*.

Admestina has the cephalothorax more parallel-sided, and the eyes overhang the jaws, but it comes close to *Fuentes*. The case of *Paramarpissa* is still uncertain, as I have not seen the type. The species I describe agrees in structure but is much smaller.

Paramarpissa insignis sp. nov.

Figs. 44, 78

Pale yellowish; cephalothorax broadly darker yellowish to brownish on sides; eyes on black spots and a pair of black spots in middle of ocular area; clypeus brown, with white hair; abdomen pale, with two dark stripes not reaching one half way back, just behind them a curved transverse black mark, sometimes connected to the stripes in front, and at tip a broad black band, rest of body and the legs pale, unmarked. Cephalothorax moderately long and low, flat above, eye-region broader in front, eyes of second row rather nearer to first than to third row; mandibles small, a minute, scarcely noticeable tooth below; sternum narrowed in front between coxae I; all legs rather short, fourth pair longest, first plainly thickened, femora strongly convex above, but twice as long as broad, tibia swollen, convex below, tarsi as long as metatarsi, both very short; on tibia I below near tip is one small spine, metatarsi I and II with two pairs very short spines below, one or two minute spines near tip of femora above, otherwise legs without spines, except hind tibia may have a faint one near base beneath. Abdomen

elongate; spinnerets prominent; vulva very small and indistinct, showing plainly only two small dark pits, and faintly behind them several curved lines.

Length 3.6 to 5 mm., cephalothorax 1.5 mm. Three specimens, two plainly marked and have evidently oviposited, the other, with enlarged abdomen, scarcely shows any markings.

Barro Colorado, 20–24 June, 17 July.

This runs to Paramarpissa in Cambridge's table, but I do not feel sure that it belongs there.

Rudrini

RUDRA GENICULATA Peckh.

One male, Barro Colorado, 22 June.

Dendryphantini

DENDRYPHANTES CUPREUS Cb.

A female, Mt. Hope, 8 July.

DENDRYPHANTES DENTIGERA Cb.

One male, Barro Colorado, 26 July.

DENDRYPHANTES LONGIPALPIS Cb.

Barro Colorado, 20–24 June.

DENDRYPHANTES LAETABILIS Peckh.

Red Tank, 30 June; Frijoles, 10 July.

DENDRYPHANTES MOMUS Cb.

Ancon, 23 March (W. M. Wheeler).

Habrocestini

PELLENES PARATUS Peckh.

One male, Barro Colorado, 20–24 June.

Ballini

ZYGOBALLUS RUFIPES Peckh.

One female, Red Tank, 1 July.

ZYGOBALLUS TIBIALIS Cb.

One female, Ancon, 23 March (W. M. Wheeler).

Homalattoides roseus Cb.

From Barro Colorado, 29 July.

Beata magna Peckh.

One female, Barro Colorado, 26 July.

Amycini

Amycus benigna Peckh.

One male, Barro Colorado, 22 July.

Amycus palpinalis Cb.

One male, Barro Colorado, 13 July.

Amycus quadriguttata Cb.

Barro Colorado, 20–24 June, 17 July.

Amycus spiralifer Cb.

Barro Colorado, 29 July.

Cobanus mandibularis Peckh.

Barro Colorado, 20 July.

Cobanus subfuscus Cb.

Barro Colorado, 23 July.

Cobanus extensus Peckh.

Barro Colorado, 20–24 June, one male.

Phyalini

The forms that Cambridge places in *Cyrene* Simon divides into two genera: *Freya* and *Phiale* (originally *Phyale*), both of Koch 1850. Simon puts these in different tribes; according to his table *Freya* should have the second eyes at or behind middle while *Phyale* should have them before middle. While I believe that these two genera are so close as to be distinguished with difficulty, I have kept them separate. *Phyale* has page precedence over *Freya*. *Cyrene* must be a synonym of *Freya*, and *Pardessus* of *Phyale*. The type of *Phyale* (*gratiosus*) has the second eyes only a trifle before the middle.

Phyale geminata Cambr.

A female has the vulva as figured by Cambridge, but he did not describe the markings. It greatly resembles *albosignata* but the median

pale stripe on abdomen is rather more narrow, the cephalothorax is darker behind than in front (as in *bicarata*), the median white stripe distinct. The venter is heavily spotted with black; the front legs are nearly black, except pale tarsi and metatarsi, the other legs pale, the hind pair with dark at tips of some joints. There is no dorsal spine on tibiae III and IV; the second row of eyes plainly behind middle.

Barro Colorado, 20–24 June, 15 July.

PHYALE PANAMENSE Chamb.

Red Tank, 1 July; Bella Vista, 7 August.

PHYALE SIMPLICICAVA Cb.

Common, Barro Colorado, July; Ancon, 6 August; Las Sabanas, 7 July; Gamboa, 9 July; Red Tank, 30 June. The male is possibly the *Cyrene bifurcata* Cambridge.

PHYALE DELECTA Peckh.

One from Gamboa, 9 July.

PHYALE MAGNIFICA Bks.

Barro Colorado, 24 July. Described from Costa Rica.

FREYA BILOBATA Cb.

Ancon, 6 August; Red Tank, 1 July; Gamboa, 9 July; Frijoles, 10 July.

FREYA FLAVA Cb.

Frijoles, 10 July.

FREYA RUSTICA Peckh.

Barro Colorado, 22 July, one male.

FREYA JUSTINA sp. nov.

Fig. 32

♂ Cephalothorax reddish, with some white scales, eyes on black spots, a white stripe each side; legs I and II black, the tarsi and base of the metatarsi pale; tibia and metatarsus I with quite long, but not very dense hair below; hind legs pale, with dark marks at tips of several joints and a black spot beneath near base of femur; mandibles and sternum reddish; abdomen with broad black area on venter, above with a pale median area, slightly broken behind into herring-bone marks, a

row or stripe of dark on each side with irregular edges, not very definite, and outside of these also pale. Tibia I with 3–3 spines below, first pair near base; metatarsus I without lateral spines, patellae I and II with small spine on inner side; tibiae III and IV with basal dorsal spine; eyes of second row at about middle (not before). Male palpus has the bulb scarcely projecting at base, on inner side the tube forms a circle, the tip of tibia has a short, truncate process. Length, 7.2 mm.

From Barro Colorado, Canal Zone, July 24.

Freya bifurcata Cb.

Males from Bella Vista, 6 July and Ancon Hill, 6 August, quite probably the male of *Phyale simplicicava* Cb.

Freya prominens Cb.

From Barro Colorado, 17 July, several.

Freya frontalis sp. nov.

Figs. 8, 9

♂ Cephalothorax red-brown, eyes on black spots, a large median (sometimes rhomboidal) white spot in the front part of eye-region, narrowly connected behind to an elongate diamond-shaped white mark near the dorsal groove, lower sides from below dorsal eyes very plainly white, sharply marked; clypeus with white hair in the middle; mandibles red-brown, sternum pale, with faint dark marks; legs pale, tibiae I and II mostly dark, with dark hair and fringe beneath, their metatarsi dark on apical halves, hind tibia dark on tip, especially beneath, metatarsi dark at tip, femora dark below near base; venter much spotted with black; dorsum of abdomen with dark stripe each side, the inner edge irregular, the pale median stripe between broken by dark dots. Eyes of second row at about middle or a trifle behind; tibia I with 3–3 spines below, the first pair near base; tibiae III and IV with basal spine above; patella I with spine on inner side. The male palpus has a very long tube arising from near base of bulb; on outer side at base is a hook, hairy at base.

Length 5.2 to 6.5 mm.

From Barro Colorado, Canal Zone, July.

Corythalia conspecta Peckh.

Barro Colorado, 1 August.

Corythalia murcida Cb.

Barro Colorado, 17 July.

Corythalia spiralis Cb.

Common, Barro Colorado, July, Frijoles, 10 July; Gamboa, 9 July; Ft. Davis, 5 July; Ancon, 6 August.

Corythalia panamana Petrunk.

Bella Vista, 6 July, 8 August.

Corythalia bicincta Petrunk.

Barro Colorado, June, July, 1 August.

Corythalia canalis Chamb.

Fig. 18

One male, the type, taken by Prof. Allee on Barro Colorado; described as a *Saitis*. Tibia I with three spines on outer side beneath, the first near base, two on inner side beneath. Femur III and IV with a long spine toward base above; tibia III without spine above. Related to *C. brevispina* but with shorter spine to tibia of palpus.

Corythalia obsoleta sp. nov.

Figs. 10, 69

♂ Similar in many respects to *panamana* and *bicincta;* there are black fringes to the first three pairs of legs, but the palpus shows no white hairs, entirely black. The cephalothorax is black, with blue reflections, behind there are two narrow white marks reaching up from hind margin toward the dorsal groove, sometimes more or less obsolete, side-margins not white. Abdomen black, no pale band at base, just beyond middle with three or four very narrow, slightly curved pale bands, sometimes partly obsolete; venter and sternum black; legs black except the pale hind pair, tarsi of third pair very pale as in allied species. Male palpus with a stout tibial spur, in some views showing serrations; embolus similar to *panamana*, but stouter. The female is similar, but paler throughout, the abdomen above with the same markings, venter mostly pale, mottled with dark; sternum and coxae pale; legs mostly pale, femora mostly black; vulva similar to *bicincta* but no round dark bodies in front.

Length 5–6 mm.

Common on Barro Colorado, June and July.

The males of *Corythalia* with fringes on the legs can be tabulated as follows: —

1. Fringes on legs I and II only 6
   Fringes on leg III also 2
2. Tibial spur of palpus very slender; cephalothorax with white on each side behind 3
   Tibial spur of palpus stout 4
3. Abdomen with large pale spot in the middle, besides transverse marks *opima*
   Abdomen with only two transverse white bars, patella of palpus with white hair ..... *spiralis*
4. Patella of palpus snow-white; abdomen broadly yellowish at base. *bicincta*
   Abdomen not yellowish at base 5
5. Pale marks on abdomen fairly wide; some white on palpus; cephalothorax with white on each side behind ..... *panamana*
   Pale marks on abdomen very narrow; no white on palpus; sides of cephalothorax not white ..... *obsoleta*
6. Abdomen with pale median stripe ..... *canalis*
   Abdomen without stripe ..... *conspecta*

Plexippus paykulli A. & S.

One, Taboga Island, 29 June.

Sidusa recondita Peckh.

Barro Colorado, 18 July.

Thiodina puerpera Htz.

Barro Colorado, June, July, August.

Thiodina sylvana Htz.

Ancon, 6 August; Bella Vista, 8 August; Red Tank, 30 June; Gamboa, 9 July, Ft. Davis, 5 July.

Chapoda peckhami sp. nov.

Figs. 5, 15, 65

♂ Cephalothorax yellow brown, darker behind, eyes on a connected black spot, some white hair near eyes; on each posterior side is a large pale spot, definitely outlined above. Abdomen pale, with many dark dots and streaks on the sides, making a more or less definite dark stripe

each side, behind in middle are faint chevrons; venter and sternum pale. Legs pale, tibia and metatarsi of front pairs dark, in hind pair with apical dark spot; palpi red brown, femur with a small rounded process near inner tip (not as large as in *C. festiva*), patella not as strongly swollen on inner side as in *C. festiva*, a large patch of snow-white hair on outer side of femur, and very short white hair at tip of palpus. Female similar; cephalothorax darker on sides and with a pale median streak behind; abdomen with irregular stripe each side, leaving a rather narrow pale median stripe, behind are some chevrons; venter with broad dark spot, made up of three dark streaks. Legs mostly pale, but hind pairs dark at base and tips of some joints; palpi snow-white.

Length 4 mm.

Barro Colorado, 22 June, July, and 4 August.

Atelurius incertus sp. nov.

Fig. 61

Cephalothorax red brown, darker in eye-region, with some fine white hair; legs and sternum pale unmarked; abdomen dull blackish above, dotted with pale, a narrow white band around base reaching back to middle on the sides, behind it an oblique white band reaching up on dorsum, and behind these another pair of white oblique bands, nearly meeting on dorsum, and short, narrow white marks over base of spinnerets; venter pale, the mandibles reddish. Cephalothorax shaped much as in true *Attus*, the surface finely roughened, the dorsal groove faint and far behind, eye-region rather short, much broader than long, scarcely broader behind, eyes of second row nearer to anterior laterals than to the dorsal eyes; mandibles with one stout tooth below; sternum broad in front; legs moderately short, patella I nearly as long as tibia I, all femora with very stout spines, three near tip and two near middle, tibia I and II with three on outer side below, one (at tip) in inner row, the first of outer row is near base, these metatarsi with two pairs below, no laterals; hind tibia with one spine below near middle and two at tip, also two on inner side, metatarsi with several at tip. Abdomen short and broad, the vulva shows a very distinct angulate incision, behind and in front some curved lines.

Length 3.5 mm.

From Barro Colorado, July.

The type of the genus has the spines reduced in number on the tibia but in somewhat different amount; by the stout spinose legs it goes in this group, and the other genera have the eye-region broader behind;

reduction of the tibial spines, rather than an exact amount of reduction, will doubtless be a better generic character.

Jollas peritas sp. nov.

Fig. 81

Cephalothorax reddish brown, darker in eye-region, with short white hair, on the side margins forming a white line, clypeus scantily haired; mandibles reddish; sternum pale brown; legs pale yellowish, front femora darker above, others near tip. Abdomen dull blackish, with some small irregular pale spots and dots above, and fine pale streaks or lines on the sides, venter pale, above with much appressed yellow hair, and some white hair, but scarcely forming a pattern, a tuft of white hair over base of the spinnerets. Cephalothorax much like true *Attus*, dorsal groove not noticeable, eye-area about one third wider than long, about as wide behind as in front, the dorsal eyes rather large and looking slightly backward, the eyes of second row about one half way between dorsal and anterior laterals. Legs of moderate length, the front patellae rather long, one or two small spines near tip of femur above, the tibiae I and II with three pairs of long spines below, the first pair near base, tibia II with one on inner side, these metatarsi with two pairs below; hind tibia with but one spine below (near base) and two on each side, these metatarsi with two whorls of spines; mandibles fairly stout, without teeth below; last joint of palpus densely haired.

Length 3.8 mm.

From Barro Colorado, July or August (C. W. Dodge).

Pachomius dybowskii Peck.

Barro Colorado, 20–24 June; Frijoles, 10 July; Ft. Davis, 5 July; Ft. Sherman, 3 July. Not uncommon, previously known only from South America.

Synemosynini

Myrmarachne centralis Peckh.

Barro Colorado, 20–24 June; 13 July; 2 August; Taboga Island, 29 June.

Paradomoetas formicina Peckh.

Barro Colorado, 24 June, one female.

Peckhamia variegata Cb.

Las Sabanas, 7 July; Taboga Island, 29 June.

Simonella americana Peckh.

Barro Colorado, June, one specimen.

Sarinda formosa sp. nov.

Fig. 6

Cephalothorax red-brown to black, in front with some metallic scales, some white hairs below dorsal eyes, clypeus and mandibles with white hair; abdomen dark brown, with a pale spot each side at constriction, hardly forming a band; sternum and venter black. Palpi dark, except pale base of femora, with long, dense, black fringe on inner side; legs pale, the tibiae and metatarsi and front tarsi darker, but other tarsi very pale, front femora dark on inner sides. General structure similar to *S. nigra*, the male palpus however, different, as in figure. The thoracic part of the cephalothorax (♂) about one and three-fourths as long as the cephalic part. Front tibia of male very long, much longer than the protarsus plus tarsus, nearly as long as femur plus patella, with three pairs of spines below, all short, the first pair near the base; protarsi I with three pairs of rather long spines; tibiae III and IV with three spines below, and others on the sides.

Length 6 mm.

From Barro Colorado, 20 July.

Fluda princeps sp. nov.

Figs. 22, 38, 73

Cephalothorax yellowish to reddish brown, eyes on black spots. Legs pale, tibia and patella I lineate with black; femur II lined in front, legs III and IV lineate nearly to tip of the metatarsi; sternum pale; abdomen pale, two oblique dark bands on basal part before the constriction, usually connected on lower sides and sometimes united to form a large dark spot above, behind the constriction a broad dark band with an anterior median extension to the mark in front, and over the spinnerets a large dark spot; venter pale. Cephalothorax not twice as long as broad, eye-region occupying about one half of length, slightly narrower behind, behind the dorsal eyes a slight impression, then sloping behind, not elevated; eyes of the second row fully as near dorsal as to lateral anterior eyes, but on the same black spot as the lateral anteriors. Legs slender, femora I enlarged, more in the male, but without crest of hair, tibia I with five (or six) pairs of long spines below, basal ones longest, others grading shorter, metatarsi with three pairs of very

long spines, the first pair nearly as long as the joint, the last pair reaching two-thirds of the tarsus; tibia II with four pairs of spines, metatarsus II with three pairs; other legs without spines. Abdomen moderately elongate, plainly constricted near middle, the apical part the larger, especially in the male.

Length 4 mm.

From Barro Colorado, 16 July.

The type of *Keyserlingella* (*K. perdita*) has the spines as in *Fluda*, and the alleged differences in eye-area are very slight; the two genera should be united. The females of the two species of *Fluda* have a mark before the vulva, this is not present in this species nor the female of *K. perdita*, and I might have considered this new species a form of *K. perdita* but Peckham figures a male of what he calls *K. perdita* and that is different from the male of my species. The male of *Martella opica* (correctly placed by Simon as a *Fluda*) is also quite different. Of *K. cara* the type was a male; the vial contains also a female which is very close to *K. perdita*, probably the same; the male has but three pairs of spines on tibia I and but two pairs on the metatarsus I, so cannot belong to *Fluda*.

Lyssomaninae

Lyssomanes

The four species taken can be separated as follows: —

1. Protarsus I but little more than twice as long as tarsus; tibia and protarsus fringed throughout length; each femur with but one spine. . . . *completus*
   Protarsus I fully three times as long as the tarsus; tibia and protarsus not fringed; each femur with several spines 2
2. Abdomen with the dark stripes reaching only a little beyond middle where they are connected, then a dark spot at tip; apical part of palpus extremely long, tibia of palpus with group of spines near middle. *dissimilis*
   Abdomen with a dark stripe each side from base to tip 3
3. Fang of mandible very sinuous; some teeth on mandible fairly large; palpal organ without basal projecting part . . . . . *mandibularis*
   Fang of mandible not sinuous; all teeth on mandible very small; palpal organ with a large basal projection . . . . . *consimilis*

Lyssomanes dissimilis, sp. nov.

Figs. 1, 2, 25, 62

♂ Mandibles elongate; beneath with four teeth, the apical one much larger than others; fang rather stout, slightly sinuous.

Palpus long and slender; the free part of tarsus nearly twice as long as the basal part, the stout outer spine of bulb has a membranous extension similar to that of *L. spiralis* but much longer, the inner spine very long and slender; the tibia hardly one-half of tarsus, but much longer than the patella, on outer side of the tibia is a group of stout bristles.

Leg I elongate, slender, protarsus fully three times as long as tarsus; tibiae I and II with five pairs of spines beneath, protarsi with three pairs, all femora with spine before middle, beyond middle and near tip.

Cephalothorax pale, rather reddish around anterior eyes, other eyes on black spots, lower margin and a median thoracic stripe dark. Abdomen pale, basal half with a stripe each side, connected rather beyond middle, and toward apex is a large dark spot; venter and sternum pale; legs pale, apical part of tibia and protarsus (especially the first pair) dark.

The female is marked as in the male, the legs with spines as in male, but those under the front tibiae are very long and much stouter than in the male.

Length 6–7 mm.

From Barro Colorado, July, and Ft. Sherman, 3 July.

Lyssomanes consimilis sp. nov.

Figs. 4, 30

♂ Mandibles elongate, with five or six minute, subequal teeth on the lower edge, well separated, two or three stiff spines above at tip; fang evenly and slightly curved, very slender, no basal tooth. Palpi rather short, patella a little shorter than the tibia, latter with a row of fine hairs on the outer side, spur rather long, broad and concave within; tarsus much longer than the tibia, but the apical part is hardly as long as the basal; palpal bulb large and very complicated, with a long basal projection. Leg I long and slender, without fringes, apical joints with many bristles; protarsus fully three times as long as tarsus; tibiae I and II with four pairs of spines beneath, three pairs under these protarsi, tibiae III and IV with one or two spines, all femora with a spine before and one a little beyond middle, and two near tip. Cephalothorax pale, eyes on black spots, lower margin and a median stripe on thoracic part brown. Abdomen pale, with two dark lines united in front. Legs pale, tibia III and IV dark at tip, leg I rather dark on femur and tip of tibia.

Length 6 mm.

From Barro Colorado, 22 July.

Lyssomanes completus sp. nov.

Figs. 3, 29

♂ Mandibles not very elongate, with one large tooth below, over three times its length from tip; fang without spine at base, but below near base it is widened.

Palpus slender, tibia and patella subequal, and each about as long as tarsus, apical part of tarsus short, only about one-half as long as basal part, tibia without brush of hairs, only scattered hairs near tip, apical spur blunt, simple. Leg I elongate, protarsus but little more than twice as long as tarsus; patella, tibia, and protarsus with a short fringe all along on under side, black, except white on basal part of the protarsus, tibia and protarsus also with a short black fringe on outer upper side; tibiae I and II with three pairs of spines beneath, two pairs below on these protarsi, each femur with but one short spine above near tip. Cephalothorax with reddish eye-area, eyes surrounded with black, thoracic part pale, lower sides especially behind brown; abdomen pale, a blackish spot each side at base, and behind are two large median black spots, between these are white spots; venter and sternum pale; legs also pale, but the front pair are reddish brown, except tarsus and the basal part of protarsus pale.

The eye-area is not as much narrowed behind as in most species, and the eyes of the third row about in line with those of the second and fourth.

Length 9–10 mm.

From Barro Colorado, 24 July.

By the fringes all along tibia it is related to *L. minaceus*, but that species has a much longer protarsus, different palpus, etc.

Lyssomanes mandibulatus Cb.

Barro Colorado, 20–24 June; Bella Vista, 8 August.

Chionoscopus flavus Peckh.

Fig. 13

A male from Ft. Davis, 5 July.

C. flavus was known from one female from "Central America," and as this is from the same region, and agrees in having the dark at tip of hind tibia and base of hind protarsi, I presume it is the unknown male of that species. It agrees with *C. gracilis* in many ways; the abdomen and cephalothorax are black, the eye-region, however, with a large pale

spot; the front and second femora have a black line in front from base to near tip (thus longer than in *C. gracilis*) and also have a similar line on the posterior face. The male palpus is black, the bulb is not nearly as globose as in *C. gracilis*, and the apical process is not tapering to a point as in *C. gracilis*, but suddenly narrowed before the black tip.

THOMISIDAE

Misumeninae

Misumena nigripes Tacz.

One from Ft. Sherman, 3 July.

Misumena pallens Keys.

Barro Colorado, 31 July; Gamboa, 9 July; Bella Vista, 7 August; Las Sabanas, 7 July.

Runcinia magna Keys.

One from Ancon, 6 August.

Runcinia parva Keys.

Barro Colorado, 20–24 June.

Tmarus intentus Cb.

One from Ft. Davis, 5 July.

Tmarus studiosus Cb.

Barro Colorado, 18 July.

Synaema jocosa sp. nov.

Figs. 43, 59

♀ Cephalothorax yellowish brown to dark brown, nearly uniform throughout; mandibles similar; legs pale yellowish, apical third of tibiae I and II and apical two-thirds of these metatarsi black, tips of hind femur, patella, tibia and metatarsus very narrowly dark. Sternum pale; abdomen pale above, with a large red-brown mark with definite outlines, in front occupying most of the dorsum, at about middle with deep lateral incision each side, then reaching down on sides, and behind a large pale triangular area each side, leaving only a median stripe dark; sides with red-brown; venter mostly pale.

Cephalothorax high, sloping forwards; quadrangle of M.E. barely narrower in front, A.M.E. larger than P.M.E., about one and a half diameter apart, rather nearer to much larger A.S.E., P.M.E. over two diameters apart, much farther from the slightly larger P.S.E. Tibia I and II with four pairs of spines below, three each side, metatarsi I and II with three pairs below, two each side; hind patella with one inner spine; hind tibia with three pairs below, and two each side.

Length 8 mm., cephalothorax 4 mm.

Three from Barro Colorado, C.Z., 20–24 June, 22 July.

Philodrominae

Philodromus traviatus sp. nov.

Fig. 55

♀ Cephalothorax brown, with numerous small blackish patches, generally darker on sides, base of mandibles dark, sternum pale; legs yellowish heavily maculate with dark brown, which tends to form stripes on front and back sides of all femora, patellae, and tibiae, but above in spots or bands, metatarsi mostly dark; abdomen above brown, with many pale dots, traces of two larger pale patches near middle, toward tip, the marks somewhat in chevrons; the dark of dorsum is sharply limited behind and on posterior sides by a darker brown line which bends up above the spinnerets; venter pale. Cephalothorax short and broad; A.M.E. fully two diameters apart, rather closer to A.S.E., quadrangle of M.E. much broader behind, the P.M.E. fully four times their diameter apart, but only about one-half as far from the equal P.S.E. Legs short, tibia and metatarsus I and II each with three pairs of spines below. Vulva showing a slender median septum, more slender than in *P. decolor*.

Length 3.5 mm., cephalothorax 1 mm.

One from Barro Colorado, C.Z., 20–24 June.

Apollophanes punctipes Cb.

Ancon, 9 August.

SELENOPIDAE

Selenops minutus Cb.

Two males from Barro Colorado, 26 July.

Selenops mexicanus Keys

One male from Barro Colorado, taken by Prof. Allee, and named by Mr. Chamberlin, and a female from Ancon, 6 July, Dr. Wheeler, on *Cordia*.

SPARASSIDAE

Olios formosus sp. nov.

Fig. 74

♀ Cephalothorax, legs, and sternum yellowish, the metatarsi heavily scopulate with dark hair; mandibles pale reddish brown. Abdomen above largely dark, with two submedian rows of yellow spots, narrowly separated by dark, with a narrow spear-mark at base, outside of these rows two or three larger pale spots; sides and venter pale, not dotted, but venter with broad black stripe. Body with yellowish hair, not especially long on the abdomen. Quadrangle of M.E. not broader behind, the A.M.E. much larger than the P.M.E., less than their diameter apart, P.M.E. fully one and a half diameter apart; each tibia with two pairs of spines below, besides the short apical pair, and two each side, each metatarsus with two pairs below and two each side. Vulva shows a median plate much longer than broad, narrowed behind, with nearly straight sides, with very narrow opening each side toward base.

Length 15 to 16 mm.

From Barro Colorado, 20–24 June, 13–29 July; Ft. Sherman, 3 July. Also many immature, the latter with abdomen very ornate. In markings it is very near *O. nigrovittatus* Keys. from Peru, but Keyserling's figure of the vulva is entirely different.

Prusias nugalis Cb.

Barro Colorado, 17 July.

Sparianthis barroana Chamb.

Barro Colorado, 19–29 July.

Described as a *Chemnis* (Clubionid). However the spinnerets are prominent the front legs laterigrade, and seven pairs of spines under tibia I, and the truncature of maxillae as in other Sparassidae. It is near to *S. amazonica* Simon, according to his description, but probably distinct from *S. granadensis* Keys.

Sparianthina gen. nov.

Laterigrade near *Sparianthis*, the spinnerets being upon an apical projection. Eyes in two rows, the posterior row slightly recurved, the

anterior row straight, and much shorter than the posterior row. Cephalothorax broad and flat, like that of *Selenops*. Legs very long and slender, the femora and tibiae about as long as body, with very long spines; palpi very long, in female longer than cephalothorax. Abdomen short, broad, and flattened; sternum cordate, but little broader in front than long; lip broader than long; maxillae slender, twice as long as broad. Mandibles rather long, with three small teeth on lower edge of the groove. In female there appears to be a distinct spiracular rima a little behind the epigynum.

Type *S. selenopoides*.

Sparianthina selenopoides sp. nov.

Fig. 28

Pale yellowish; cephalothorax with numerous scattered flecks, the larger ones near margin and two near middle; several dots on front of the mandibles, and many on legs and palpi, mostly at bases of spines or hairs; abdomen faintly brown above, with many tiny yellow dots and a large basal pale mark, two very large muscular impressions beyond the middle, the subbasal pair much fainter; sternum and venter pale unmarked. Quadrangle of M.E. plainly broader behind than in front, A.M.E. less than diameter apart, P.M.E. nearly twice diameter apart, P.M.E. largest, all eyes with very distinct black marks around them. Second pair of legs rather longer than first; femora with several spines above, two of them long; tibiae I and II with four pairs of spines, all very long, none at tip, these metatarsi with two pairs near base and one pair near middle, hind tibiae and metatarsi with two pairs below, two each side, and three above. Body and legs with white hair, most noticeable on base and sides of abdomen; the vulva of female very large, showing a median septum, narrow in front, broad behind, and large cavity each side. Male palpi long, tarsus with long tip, the outer side of tibia with two projections, one slender and pointed, the other broad.

Length 6.5 mm., cephalothorax 3 mm., patella plus tibia II of ♂ 10 mm., of ♀ 7.5 mm.

From Barro Colorado, Canal Zone, 17 July.

APHANTOCHILIDAE

Aphantochilus rogersi Cb.

One specimen taken by Prof. Bradley at Barro Colorado in March, and sent by him to Prof. Wheeler with specimens of *Cryptocerus atratus*

for identification. It agrees closely with a specimen from Paraguay and taken with the same ant, and with the figures and description of Cambridge. The figures of Simon (Hist. Nat. I, p. 955) showing a much narrowed clypeal margin, and more separated posterior median eyes, must be another species. Specimens sent by Dr. Reimoser, although adult, are smaller, with smaller basal shield on venter, and less triangular cephalothorax, are also another species.

PISAURIDAE

Trechalea magnifica Petrunk.

Barro Colorado, 18 July, and Rio Esnape (Barbour).

In the posterior central eyes being less than a diameter apart, it is near to *T. extensa* Cb., but specimens from Costa Rica that I identified as *extensa* have a higher clypeus, about four times diameter of central anterior eyes, and the legs are more hairy.

Syntrechalea tenuis Cb.

Barro Colorado, 13–23 July, on the bark of trees.

Thaumasia uncata Cb.

Barro Colorado, 20–24 June, 13–31 July. Common.

Thaumasia velox Simon

One from Ft. Davis, 5 July.

Architis tenuis Simon

Two from Barro Colorado, 23 July.

Staberius aculeatus Simon

Ft. Davis, 5 July; Las Sabanas, 7 July.
Equal to *Thanatidius spinipes* Sim.

CTENIDAE

Acanthoctenus spinipes Keys.

One from Almirante (C. W. Dodge).

Cupiennius foliatus Cb.

Common on Barro Colorado, 20–24 June, 13–31 July. *Ctenus dolomedes* Chamb. is a male of this species; *C. guatemalicus* Strand 1910 is probably the same as *C. minimus* Bks. 1909.

Cupiennius getazi Simon

One from Almirante (C. W. Dodge).

Cupiennius coccineus Cb. (?)

Females from Barro Colorado and Ft. Sherman agree with this, except that they have a black ventral stripe; a male would, perhaps, show that it is distinct.

Lycoctenus bogotensis Keys.

Two females from Ft. Randolph, March (J. B. Shropshire).

Ctenus sinuatipes Cb.

Two females from San Pablo, Panama (Lesley coll.) probably belong here; the vulva is rather more narrow at base than those I have seen from Costa Rica.

Ctenus medius Keys.

Fig. 57

Two females from Barro Colorado, 13–18 July. These two agree fairly well with specimens of *Ct. medius* from southern Brazil. But each side of the oval bodies is a dark cavity before the rim, and the posterior part of the vulva is black, the anterior part pale. The two specimens, however, are not alike in details; one (after oviposition) shows the vulva as figured, while in the other (before oviposition) the vulva is broader and the oval bodies much less prominent. The abdomen has a pale stripe above. In one the P.M.E. are a little closer together than in the other. I expect that *medius* is the same as *Ct. ornatus* Keys., also from South Brazil. It is different from *incolans* and *supinus*, which I have from Costa Rica.

Ctenus sp.

One specimen from Barro Colorado, June, of a much smaller species belonging to the section with the ocular quadrangle much narrowed in front.

LYCOSIDAE

Lycosa longitarsis Cb.

Common, Barro Colorado, July, August, Frijoles, 10 July, Ft. Sherman, February (Shropshire).

L. eutypa Chamb., according to type, is the same species.

ARCTOSA PANAMANA Petrunk.

Two from Barro Colorado, 17 July.

SCHIZOGYNA TRISTANI Bks.

Barro Colorado, 17 July.

Pardosa albopilosa Petrunk. is doubtless the same species, the details do not appear exactly the same in various specimens.

ALLOCOSA PANAMANA Chamb.

Fig. 54

Two females from Ft. Sherman, 3 July. This was described from two specimens in very bad condition taken from the stomach of a toad.

The cephalothorax is mostly dark brown, black in the eye-region; through the middle is a broad pale stripe, rather narrow between the posterior eyes, then widened, and the basal part again narrow, in middle of this pale streak are two oblique dark marks; the dark of sides contains four pale spots. Abdomen mostly dark above, with a short, basal median pale mark, and behind numerous irregular pale spots more or less in four rows; venter and sternum pale; legs pale, banded with dark, three bands on each femur, two on tibia and metatarsus.

PIRATA PAGICOLA Chamb.

The type from Barro Colorado is a typical *Pirata*.

OXYOPIDAE

TAPINILLUS LONGIPES Tacz.

Two from Ft. Sherman, 3 July.

PEUCETIA BIBRANCHIATA Cb.

Ancon, 5–6 August; Taboga Island (young).

OXYOPES CLYPEATUS Cb.

Barro Colorado, 24 June, one specimen.

OXYOPES GLOBOSUS Cb.

Barro Colorado, 29 July, one specimen.

OXYOPES SALTICUS Htz.

Ancon, 6 August; Bella Vista, 8 August; Las Sabanas, 7 July; Gamboa, 9 July.

HERSILIDAE

Tama mexicana Cb.

Barro Colorado, 23, 25, 26 July; on the bark of trees, dodging with amazing swiftness.

THERIDIIDAE

Theridiinae

Theridiini

Theridion alacre Keys.

Common, Barro Colorado, 20–24 June, 18–31 July; Ft. Sherman, 3 July.

Theridion fordum Keys.

Common, Barro Colorado, 20–24 June; 13–22 July; Taboga Island, 29 June.

Theridion niveum Cb.

Barro Colorado, 17–23 July; Ft. Sherman, 3 July.

Theridion rostratum Cb.

Barro Colorado, 13 July.

Theridion taeniatum Keys.

Common, Barro Colorado, 20–24 June, 19–20 July, 2 August.

Theridion indicatum sp. nov.

Figs. 19, 48

Cephalothorax, legs, mouth parts, and sternum pale yellowish; abdomen whitish. Cephalothorax of male produced in front in a large lobe, seen from above nearly square, the A.M.E. on the side of the lobe, and at tip, are two long, stiff bristles, directed forward. Cephalothorax high behind, seen from side scarcely sloping until near end. Legs slender, with many fine hairs; sternum broad, broad between hind coxae; mandibles small; a row of four or five bristles on outer edge of maxilla. Eyes are about equal, posterior row strongly recurved; the P.M.E. about diameter apart, the quadrangle of M.E. a little broader in front. Abdomen short and rounded, above with many fine white hairs, beneath at base with a broad corneous plate.

Length body 1 mm., tibia plus patella I 1 mm. One male from Barro Colorado, 31 July.

HUBBA INSIGNIS Cb.

Fig. 31, 33, 51

One male from Barro Colorado, 13 July. This is scarcely more than a Theridion, and may be, as Simon suggests, his *Theridion caracasanum*. The mandibles are rather large, with a long fang; the legs are more bristly than usual in Theridion. In my specimen the bristles on the lobe are more spine-like than in Cambridge's figure.

THERIDULA TRIANGULARIS Keys.

Frijoles, 10 July.

ANELOSIMUS EXIMIUS Keys.

Barro Colorado, 16–24 July; Ft. Sherman, 3 July; Taboga Island, 29 June. This is the social spider, its communal webs hold many specimens of both sexes which live together in amity.

ACHAEA COMPRESSA Keys.

Barro Colorado, 20 July; one appears to be this species.

CHRYSSO VEXABILIS Keys.

Barro Colorado, 18 July; Frijoles, 10 July; Las Sabanas, 7 July; Ancon, July, August (Wheeler) on *Cordia*.

CHRYSSO ELEGANS Tacz.

Three from Barro Colorado, 13 July.

CHRYSSO NIGRIPALPIS sp. nov.

Figs. 46, 72

Cephalothorax, mandibles, sternum and abdomen above black; venter black on basal part to the furrow, then pale, with a median black V-mark. Legs (including coxae) pale yellowish, the front femora with a short black line at base in front; palpi deep black. General structure as in other species, abdomen not projecting much at tip, about twice as long as broad; legs less long than in other species, the front femora hardly as long as the abdomen, the hind femora nearly as long as the front, all legs with short fine hairs.

Length 2.1 mm.

Three females from Barro Colorado, 20–24 June.

Teutanini

LITHYPHANTES NIGROFEMORATUS Keys.

One from Barro Colorado, 16 July.

WAMBA CONGENER Cb.

One specimen of this tiny spider, Barro Colorado, 13 July.

Euryopini

SPINTHARIS FLAVIDUS Htz.

Barro Colorado, 24 June, 18 July.

THWAITESIA AFFINIS Cb.

One from Las Sabanas, 7 July.

DIPOENA STRIATIPES Simon

Barro Colorado, 20–24 June, one male of this remarkable spider.

EURYOPIS LINEATIPES Cb.

Gamboa, 9 July.

EURYOPIS NIGRIPES sp. nov.

Figs. 47, 60

♀ Cephalothorax jet black, mandibles and sternum also; legs black, except basal part of femora III and IV which are very pale, also a small pale spot at base of femur I and II above. Abdomen silvery above, with a large shield-like dark mark on base, tapering behind and almost reaching tip, behind it are one or two small dark spots; the lower posterior sides are also dark; the venter is black, a silvery area each side of the basal plate, another smaller pale area behind the vulva, and a transverse silvery mark behind the latter. Palpi mostly dark, but some pale spots on basal joints. General structure of *E. funebris*; the quadrangle of M.E. is fully as broad in front as behind, the A.M.E., no larger than P.M.E., are a trifle farther apart; the P.M.E. more than diameter apart. Abdomen broad, but pointed behind; the vulva shows a simple rounded area, longer than broad, faintly pointed in front, with a dark dot at each side, and two behind.

Length 3 mm., cephalothorax 1 mm.

One from Mt. Hope, Canal Zone, 8 July.

By shape of vulva it is closely related to *E. floricola* of South Brazil,

but the complete shield mark, and the black legs, especially tarsi, separate it.

EPISINUS COGNATUS Cambr.

Figs. 23, 45, 49, 53, 76

A male and female from Barro Colorado, C.Z., 24 July. The male has the spine at tip of bulb almost straight, and the eye-tubercle is higher than one would suppose from the Cambridge figures; the posterior eye-row is slightly recurved. The female was not known. It is very much larger than the male, mostly in the abdomen; the latter is very broad behind middle, broader than *E. bigibbosus*, and with two tubercles as in that species; each tubercle has four shining black spots, elsewhere above there are dark lines, spots, and shadings; the tips of the femora and tibia in both sexes are darker, but broader in the female. The vulva is less elongate than in *E. bigibbosus;* it is dark red-brown, showing a pale area on each posterior side.

HELVIBIS KEYSERLINGI sp. nov.

Figs. 34, 37, 67

♀ Cephalothorax reddish, black in anterior part over eye-region, and posterior part from the groove back blackish; mandibles black; palpi partly black; sternum reddish, black behind; abdomen pale yellowish, rather darker above in some specimens, with an elongate pale area each side near middle, on each anterior side is an elongate black mark broader behind and sloping downward, the tip of abdomen is sometimes dark above; legs pale yellowish, unmarked. Cephalothorax elongate, more so than in *H. thorelli*, narrowed behind, broadest much before middle, a transverse curved furrow behind middle. Abdomen elongate, scarcely narrowed in the middle above, projecting behind the spinnerets, sometimes about as far as before them. Vulva shows a large semi-oval area, in front faintly showing two darker circular areas, behind a pale rounded area, longer than broad.

Length 3.3 to 3.5 mm.

Canal Zone, Barro Colorado, 19 July.

Argyrodini

ARGYRODES AMERICANUS Tacz.

Barro Colorado, 20–24 June, 14–23 July, 4 August.

ARGYRODES CAUDATUS Tacz.

Barro Colorado, 25 June, 17–29 July; Ancon, 5 August; Bella Vista. 6 July; Ft. Sherman, 3 July.

ARGYRODES NEPHILAE Tacz.

Ancon, 5 August; Bella Vista, 6 July.

ARGYRODES ELEVATUS Tacz.

Ancon, 5 August; Bella Vista, 8 August.

ARGYRODES JUCUNDUS Cb.

Bella Vista, 6 July.

RHOMPHOEA PROJICIENS Cb.

Barro Colorado, July.

ARIAMNES LONGICAUDATUS Keys.

Barro Colorado, 20–24 June.

LINYPHIIDAE

ERIGONINAE

CERATINELLA sp.

Barro Colorado, 15 July. One female, in appearance much like *C. emertoni*, and possibly may be it.

LINYPHIINAE

NERIENE BIPUNCTATA Keys.

Taboga Island, 29 June.

FRONTINELLA UNCATA Cb.

Many females. Barro Colorado, June, July; Frijoles, 10 July; Gamboa, 9 July; Ft. Davis, 5 July; Ancon, 7 August (Wheeler) on *Cordia*.

FRONTINELLA CALCARIFERA Keys.

A few; Barro Colorado, 19 July, Las Sabanas, 7 July. Probably the male of *uncata*.

Bathyphantes plagiata sp. nov.

Figs. 17, 20, 40, 66

Cephalothorax pale yellowish brown, some black around eyes and the posterior lateral margins narrowly black, mandibles, legs, and sternum similarly pale. Abdomen whitish, a median black stripe above, growing broader behind and ending suddenly some distance before tip; a large black spot each side near base of the spinnerets, an elongate, curved black mark each side near base, ending beyond the furrow; venter with a large dark mark in middle. A.M.E. small, close together, farther from the much larger A.S.E., latter larger than the P.S.E.; P.M.E. largest, less than diameter apart, about their diameter from the much smaller P.S.E.; quadrangle of M.E. much broader behind.

The male palpus has a very large paracymbium, and the cymbium has an angle behind and two curved processes at base; the bulb is very large and extremely complicated. There are no teeth in front on the male mandibles.

Length 1.6 mm.

Canal Zone, Barro Colorado, 16 July.

ULOBORIDAE

Uloborus signatus Cb.

Barro Colorado, 20–24 June, 22 July.

Uloborus aegrotus Simon

Barro Colorado, 20–24 June.

Uloborus variegatus Cb.

Many, Barro Colorado, June, July.

Ariston albicans Cb.

One female, Barro Colorado, 20–24 June.

Miagrammopes alboguttata Cb.

Several, Barro Colorado, 22 June, 15–31 July.

TETRAGNATHIDAE

Tetragnathinae

Tetragnatha mexicana Keys.

Frijoles, 10 July.

Tetragnatha pallida Cb.

Barro Colorado, 17 July.

Tetragnatha tenuissima Cb.

Ft. Davis, 5 July; Mt. Hope, 8 July.

Glenognatha centralis Chamb.

Described from Panama; the type is a true Glenognatha with large, porrect and strongly divergent jaws, provided with large teeth, of about the same size and appearance as *G. minuta* Bks.

Mimognatha gen. nov.

Type *Mysmena bulbifera* Bks. (*Theridium foxi* McCook). Differs from *Glenognatha* in the shorter cephalothorax, the male mandibles not noticeably divergent nor porrect, and armed with only small teeth; the male palpus has the part beyond the large bulb, very much abbreviated, much more so than in *Glenognatha*. The abdomen is also shorter than in that genus.

Mimognatha foxi McCook

One male from Panama, Bella Vista, 6 July.

I cannot see any difference between this specimen and males from Virginia, except in the smaller size; the palpus, even in apical part, appears to be the same, and the teeth and bristles on the front of the mandibles are the same.

Metinae

Pseudometa alboguttata Cb.

Barro Colorado, 20–29 June, 13–17 July.

Mecynometa globosa Cb.

Two, Barro Colorado, 25 June, 22 July.

Leucauge argyra Walck.

Colon, 16 August; Mt. Hope, 8 July; Frijoles, 10 July; Red Tank, 30 June; Ancon, 5 August; Bella Vista, 6 July. Common, but not taken on Barro Colorado.

Leucauge mandibulata Cb.

Barro Colorado, 25 June, 20–30 July, 1 August.

LEUCAUGE LUGENS Cb.

Barro Colorado, 22 June, 29 July.

LEUCAUGE MOERENS Cb.

Barro Colorado, 20–24 June, two specimens.

LEUCAUGE IDONEA Cb.

Ancon, 5, 6 August; Bella Vista, 6 August; Frijoles, 10 July.

LEUCAUGE AUROSTRIATA Cb.

Gamboa, 9 July; one specimen.

EPEIRIDAE

NEPHILINAE

NEPHILA CLAVIPES Linn.

Common; Barro Colorado, Ft. Davis, Ft. Sherman, Red Tank, Bella Vista, Ancon, Taboga Island. Mostly immature, but in August becoming mature. Often webs are close together or partly connected and on the top of Ancon Hill were a large colony with practically all the webs connected and forming an immense structure from the top of a tree down to some bushes.

ARGIOPINAE

ARGIOPE ARGENTATA Fabr.

Barro Colorado, Las Sabanas, and Ft. Sherman, mostly not mature. *Gea panamensis* Chamb. is evidently the male.

GEA HEPTAGON Htz.

Barro Colorado, 20–24 June.

GASTERACANTHINAE

GASTERACANTHA KOCHI Butler

Barro Colorado, 29 July; Colon, 16 August; Ancon, 5, 6 August; Almirante (C. W. Dodge and J. D. Smith).

ACROSOMINAE

ACROSOMA MAMMILLATA Butler

Common, Barro Colorado, 20–24 June, 13–24 July; Gamboa, 9 July.

Acrosoma longicauda Cb.

Barro Colorado, 20–24 June, 13 July. This must be the male of *mammillata*.

Acrosoma obtusispina Keys.

Common. Barro Colorado, 20–24 June, 13–29 July; Ft. Davis, 5 July; Bella Vista, 6 July; Marajal (Wheeler). These are all typical forms as figured by Keyserling and by Cambridge, Biologia, plate 50, fig. 9.

Acrosoma cornigera Cb.

Barro Colorado, 13 July; Ft. Davis, 5 July. Evidently the male of *obtusispina*.

Acrosoma sedes Getaz

Fig. 36

Barro Colorado, 22–25 July, five females, all alike in coloration. The dorsum is yellow, with narrow black lines which outline large and small spots of the yellow. These markings are so entirely different from those of *A. obtusispina* that I believe they indicate a separate species. The small intermediate spine is usually fairly distinct, as in fact it often is in *A. obtusispina;* the spine at base of the large apical one is larger than in *A. obtusispina*. Neither these nor the specimens of *A. obtusispina* show approach to the typical *A. scxspinosa*, and I consider them perfectly distinct species therefrom.

Acrosoma sp.

Fig. 35

A male, Barro Colorado, 30 July, has the abdomen more constricted (as seen in figure) than any species figured by Keyserling or Cambridge; it might be the male of *sedes*.

Acrosoma patruelis Koch.

Fairly common, Barro Colorado, 20–24 June, 13–17 July; Gamboa, 9 July.

Acrosoma petersi Tacz.

Barro Colorado, 20–24 June; Gamboa, 9 July.

Acrosoma schreibersi Perty

Common, Barro Colorado, 20–29 June, 13–31 July, 2 August. Not taken elsewhere, a characteristic South American species.

Acrosoma furcula Cb.

Barro Colorado, 30 July, one female.

Micrathena quadriserrata Cb.

Ft. Sherman, 3 July, one specimen.

Epeirinae

Eriophora edax Blackw.

Cristobal, 10 August; Ancon, 5, 6, August.

Eriophora purpurascens Cb.

Barro Colorado, 20–24 June, 13–30 July.

Eriophora nephilodes Cb.

Barro Colorado, 20–24 June, 13–31 July; Ancon, 5 August.

Eustala fuscovittata Keys.

Barro Colorado, 17 July; Colon, 16 August; Mt. Hope, 8 July; Frijoles, 10 July; Gamboa, 9 July; Las Sabanas, 7 July; Bella Vista, 4 August; Ancon, 5 August; Punto Paitea (Wheeler).

Eustala bifida Cb.

Barro Colorado, 20–24 June, July (C. W. Dodge).

Eustala guttata Cb.

Mt. Hope, 8 July, two specimens.

Eustala conformans Chamb.

The male type agrees well with *minuscula*, which is hardly more than a variety of the widespread *vegeta*.

Epeira incerta Cb.

Ft. Sherman, 3 July.

Epeira truncata Keys.

Barro Colorado, 18 July, one specimen.

Epeira trispinosa Keys.

Ft. Sherman, 3 July, one example.

Epeira solersioides Cb.

Ancon, 6 August; Bella Vista, 7 August; Taboga Island, 29 June.

Epeira pallidula Keys.

Barro Colorado, 15–24 July; Gamboa, 9 July.

Epeira glabrata Cb.

Common, Barro Colorado, 13 July; Ft. Sherman, 3 July; Ft. Davis, 5 July; Frijoles, 10 July; Red Tank, 30 June; Las Sabanas, 7 July.

Epeira detrimentosa Cb.

Barro Colorado, 20 July, one specimen.

Epeira championi Cb.

Common on Barro Colorado, 24–31 July, 1 August.

Epeira sexta Chamb.

Described in his Peruvian paper, but from Panama. The type is immature; it has a great resemblance to *E. scutulata*, but in structure very different. The cephalothorax is plainly a little higher at middle than in front; the groove broadly curved. The numerous short spines on the legs toward tip separate it.

Epeira albostriata Keys.

Frijoles, 10 July; Las Sabanas, 7 July.

Metazygia keyserlingi sp. nov.

Fig. 63

Cephalothorax, mandibles, and sternum dull yellowish, head blackish; legs dull yellowish, front femora dark toward tip above, tibiae and metatarsi also dark near tip. Abdomen whitish above, two large elongate dark marks at base (the beginning of an indistinct or obsolete folium), sides black, lower sides narrowly white, venter black, with median triangular white spot. Cephalothorax moderately broad; abdomen elliptical; vulva broad, no basal projection. Legs hairy, femora without spines below, but some below on tibiae and metatarsi; all legs rather short. Length 4–4.5 mm.

From Barro Colorado, 20–24 June, 13 July.

It greatly resembles Keyserling's figure of *Epeira genialis* from southern Brazil. The vulva is also very similar. It is, however, much

smaller, and with pale sternum, while Keyserling says nothing about black sides, and venter with median pale spot, so it is probably distinct therefrom.

METAZYGIA GREGALIS Cb.

Red Tank, 30 June. *Eustala tuceps* of Chamberlin is this species.

CYCLOSA CAROLI Htz.

Three from Barro Colorado, 2 August.

CYCLOSA WALCKENAERI Cb.

Two from Bella Vista, 8 August.

MANGORA BIMACULATA Cb.

Many, Barro Colorado, 14–31 July.

MANGORA PICTA Cb.

Barro Colorado, 22 June, 30 July.

MANGORA SPINULA Cb.

Males, Barro Colorado, 22 June; Red Tank, 1 July.

MANGORA TRILINEATA Cb.

Common, Barro Colorado, 20–24 June; Ft. Sherman, 3 July; Ft. Davis, 5 July; Mt. Hope, 8 July; Frijoles, 10 July; Gamboa, 9 July.

ACACESIA FOLIATA Htz.

Ancon, 9 August; Bella Vista, 2 July; Las Sabanas, 7 July; Mt. Hope, 8 July.

METEPEIRA LABYRINTHEA Htz.

Barro Colorado, 15 July, one specimen.

WAGNERIANA TAURICORNIS Cb.

Barro Colorado, 20–24 July.
The shoulder cusps are simple in these specimens.

WAGNERIANA SPICATA Cb.

Two specimens from Ft. Sherman, 3 July, and Ancon, 5 July, are probably this species, but the shoulder cusps are simple.

Parawixia destricta Cb.

Barro Colorado, June, one specimen. A male from Taboga Island may be another species.

Pronous beatus Cb.

Barro Colorado, 20–24 June, 16–20 July.

Edricus crassicauda Keys.

Many from Barro Colorado, 20–24 June, 13–30 July, 2 August.

Witica thalis Cb.

One from Barro Colorado, 20–24 June.

Scoloderus americanus Cb.

Barro Colorado, 20 July, one specimen.

Verrucosa reticulata Cb.

Almirante, Bocas del Toro, July, August (C. W. Dodge).

Verrucosa mexicana Lucas

Barro Colorado, 21 July (Wheeler).

MIMETIDAE

Mimetus bigibbosus Cb.

Barro Colorado, 13–31 July.

Gelanor zonatus Koch.

One from Barro Colorado, 24 June.

EXPLANATION OF PLATES

PLATE 1

PLATE 1

Fig. 1. Lyssomanes dissimilis, palpus.
Fig. 2. Lyssomanes dissimilis, palpus.
Fig. 3. Lyssomanes completus, palpus.
Fig. 4. Lyssomanes consimilis, palpus.
Fig. 5. Chapoda peckhami, palpus.
Fig. 6. Sarinda formosa, palpus.
Fig. 7. Wulfila mandibulata, palpus.
Fig. 8. Freya frontalis, palpus.
Fig. 9. Freya frontalis, palpus.
Fig. 10. Corythalia obsoleta, palpus.
Fig. 11. Castianeira memnonia, palpus.
Fig. 12. Wulfila mandibulata, palpus.
Fig. 13. Chionoscopus flavus, palpus.
Fig. 14. Wulfila mandibulats, palpus.
Fig. 15. Chapoda peckhami, palpus.

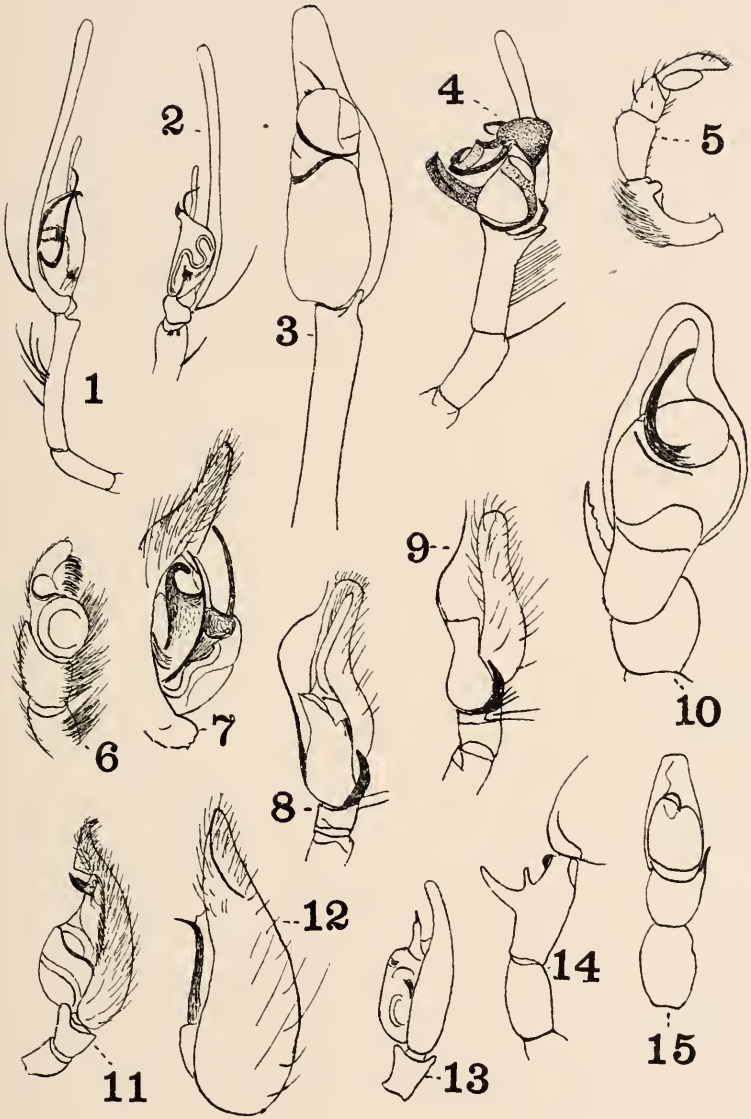
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PLATE 2

PLATE 2

Fig. 16. Modisimus pulchellus, palpus.
Fig. 17. Bathyphantes plagiata, tarsus of palpus.
Fig. 18. Corythalia canalis, palpus.
Fig. 19. Theridion indicatum, palpus.
Fig. 20. Bathyphantes plagiata, palpus.
Fig. 21. Modisimus pulchellus, palpus, above.
Fig. 22. Fluda princeps, palpus.
Fig. 23. Epesinus cognatus, palpus.
Fig. 24. Blechroscelis modestus, palpus.
Fig. 25. Lyssomanes dissimilis, fang.
Fig. 26. Otiothops macleayi, basal plate of venter.
Fig. 27. Wulfila mandibulata, hairs of cephalothorax.
Fig. 28. Sparianthina selenopoides, vulva, palpus, spinnerets and eyes.
Fig. 29. Lyssomanes completus, fang.
Fig. 30. Lyssomanes consimilis, fang.
Fig. 31. Hubba insignis, palpus.
Fig. 32. Freya justina, palpus.
Fig. 33. Hubba insignis, tip of palpus, above.

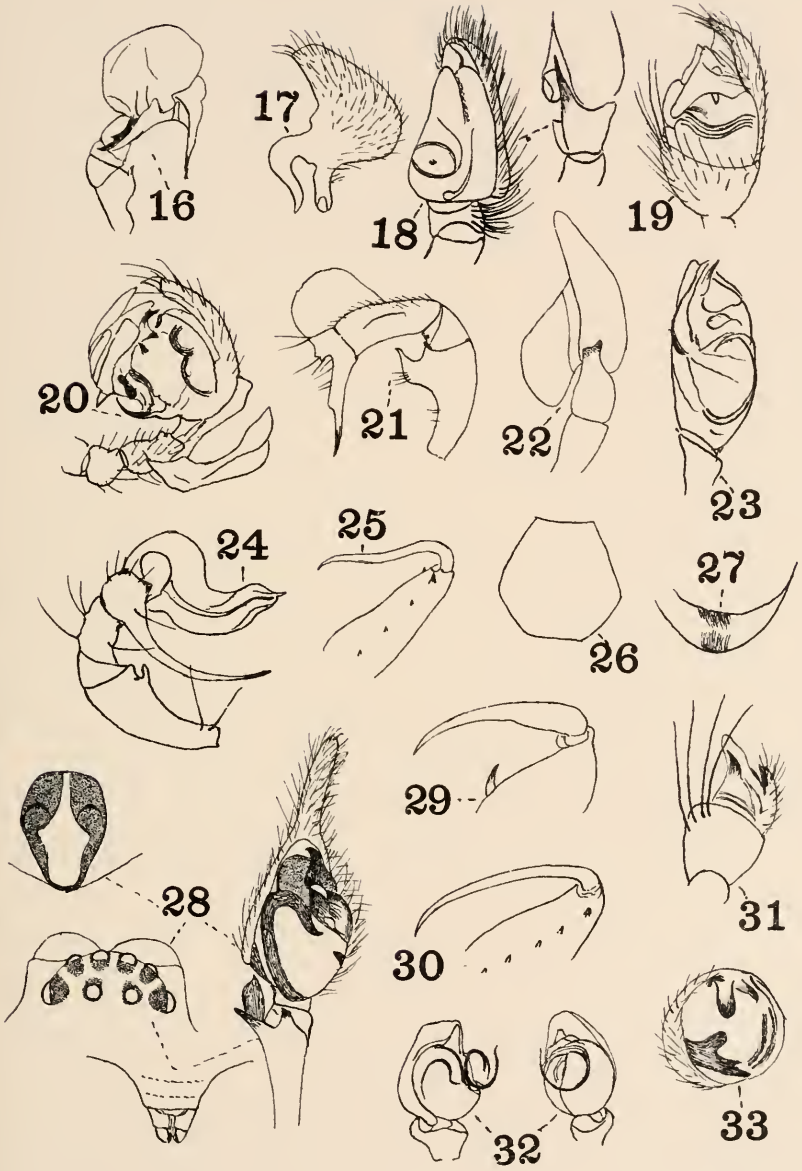
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PLATE 3

PLATE 3

Fig. 34. Helvibus keyserlingi, spider, above.
Fig. 35. Acrosoma, sp., from above.
Fig. 36. Acrosoma sedes, abdomen.
Fig. 37. Helvibus keyserlingi, abdomen.
Fig. 38. Fluda princeps, abdomen.
Fig. 39. Blechroscelis modestus, eyes.
Fig. 40. Bathyphantes plagiata, abdomen.
Fig. 41. Blechroscelis modestus, abdomen.
Fig. 42. Otiothops macleayi, eyes.
Fig. 43. Synaema jocosa, abdomen.
Fig. 44. Paramarpissa insignis, above.
Fig. 45. Epesinus cognatus, eyes.
Fig. 46. Chrysso nigripalpis, abdomen.
Fig. 47. Euryopis nigripes, abdomen.
Fig. 48. Theridium indicatum, head.
Fig. 49. Epesinus cognatus, abdomen.
Fig. 50. Castianeira memnonia, dorsal shield.
Fig. 51. Hubba insignis, head.
Fig. 52. Castianeira luctuosa, dorsal shield.
Fig. 53. Epesinus cognatus, abdomen.

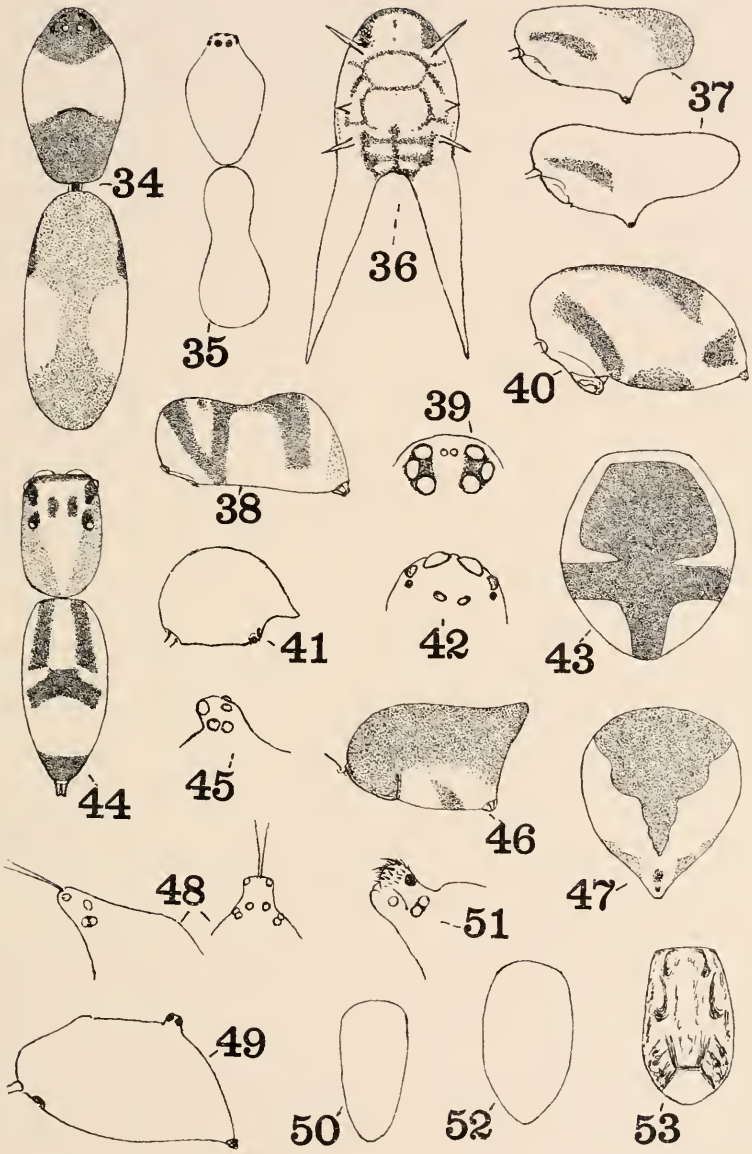
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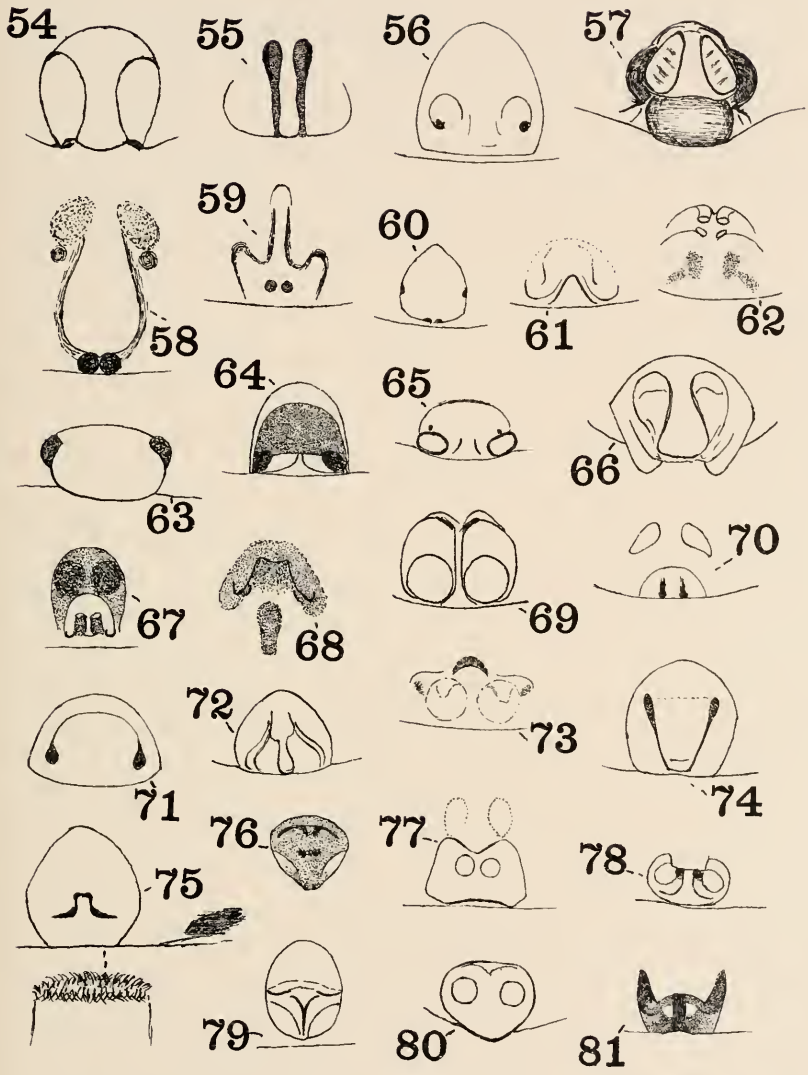
PLATE 4

PLATE 4

Fig. 54. Allocosa panamana, vulva.
Fig. 55. Philodromus traviatus, vulva.
Fig. 56. Myrmecotypus cinctus, vulva.
Fig. 57. Ctenus medius, vulva.
Fig. 58. Echemus iotus, vulva.
Fig. 59. Synaema jocosa, vulva.
Fig. 60. Euryopis nigripes, vulva.
Fig. 61. Atelurius incertus, vulva.
Fig. 62. Lyssomanes dissimilis, vulva.
Fig. 63. Metazygia keyserlingi, vulva.
Fig. 64. Castianeira memnonia, vulva.
Fig. 65. Chapoda peckhami, vulva.
Fig. 66. Bathyphantes plagiata, vulva.
Fig. 67. Helvibus keyserlingi, vulva.
Fig. 68. Modisimus pulchellus, vulva.
Fig. 69. Corythalia obsoleta, vulva.
Fig. 70. Myrmecotypus similis, vulva.
Fig. 71. Castianeira luctuosa, vulva.
Fig. 72. Chrysso nigripalpis, vulva.
Fig. 73. Fluda princeps, vulva.
Fig. 74. Olios formosus, vulva.
Fig. 75. Aysha similaris, vulva.
Fig. 76. Epesinus cognatus, vulva.
Fig. 77. Eutichurus sp. vulva.
Fig. 78. Paramarpissa insignis, vulva.
Fig. 79. Cesonia cincta, vulva.
Fig. 80. Blechroscelis modestus, vulva.
Fig. 81. Jollas peritas, vulva.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AT HARVARD COLLEGE.
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THE SQUAMATION OF HOMOEOSAURUS

By Thomas Barbour and H. C. Stetson

With One Plate.

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February, 1929.

No. 4.— *The Squamation of Homoeosaurus*

By Thomas Barbour and H. C. Stetson

A specimen of *Homoeosaurus maximiliani* v. Meyer has recently been discovered, in the collections of the Museum of Comparative Zoölogy, in which patches of body and tail squamation are well preserved. This specimen, from the Lithographic limestone of Solenhofen, was acquired with the famous second Haeberlein collection, purchased by Alexander Agassiz in 1882. In number and in quality of the specimens, with the exception of Archaeopteryx, this collection was fully the equal of the first, which Dr. Haeberlein sold to the British Museum.

The specimen in question still retains three patches of scales, a large one on the tail just posterior to the sacrum, a small one posterior to that, and another, consisting of only a few scales, on the neck at the base of the skull. The animal presents its dorsal aspect (Fig. 1). The scales appear to be casts, rather than lime replacements, although due to the quality of the Solenhofen sediment it is exceedingly difficult to tell which is the case. In shape, the scales are subrectangular plates, some of them approaching the cycloidal. They are somewhat irregular both as to size and arrangement and are slightly imbricated. The tail, normally thick and rounded at this point, has been, of course, flattened in the fossil. The piece of skin which carries the scales has been pressed down so tightly over the backbone that the neural spines have broken through. The scales near the median dorsal line are a little smaller than those more ventrally situated, i.e. as you approach the margins of the patch (Fig. 2). The scales from the small patch on the tail immediately posterior to the one just described are more nearly rectangular. The neck scales near the median dorsal line, the only ones preserved, are subrectangular and small.

Broili (1925) has described rounded dermal ossicles from the fore and hind limbs of *H. pulchellus* Zittel. This description and the one above complement each other, and give a rather complete picture of the squamation of this animal. The question will be discussed below in connection with the modern Sphenodon.

Many reptiles have the power of regenerating lost tails. Boulenger (1888) and others consider that the new scaling, in some cases, notably in Sphenodon and in Pseudopus, is a reversion to an ancestral form. Barbour (1912) found that certain Geckos and Skinks from the East

Indies showed the same characteristics, viz., a definite simplification of squamation on the regenerated part and an absence of ornamentation. This had been commented upon by Werner (1896), a paper which Barbour had not seen when he wrote. On the other hand, some of the Lacertidae, Gerrhosauridae and Anguidae "reproduce caudal scaling true to their type," Gadow (1920).

The tail thus regenerated is really a false one, as the vertebral column is not reproduced, its place being taken by a nonsegmented rod of cartilage. New muscles however do develop and, of course, new skin. Barbour (1926, p. 60, Fig. 79) figures a dissection of this.

Turning now to Sphenodon, we find a striking corroboration of this theory by comparing the regenerated tail of this animal with the squamation of Homoeosaurus.

Fig. 3 shows well the abrupt break in the character of the caudal squamation, viewed ventrally, when the regenerated portion is reached. Anterior to the break, the scales are large, rectangular plates fairly regular in their arrangement and slightly imbricated. Posterior, they are smaller, subrectangular and irregular in their arrangement. The scales on the more distal portions of the regenerated piece have a tendency to increase in size. In Fig. 4, a lateral view, the break is even more striking. The scales of the unregenerated portion are microscopically small and stud-like, and are interspersed with other large, spiny scales, while those of the regenerated portion keep their subrectangular, plate-like character, but grow progressively smaller dorsally. The median dorsal scutes are relatively small and undeveloped on the reproduced portion.

From the description above it will be seen that this regenerated squamation is a close parallel to that of Homoeosaurus. The scales are of the same type — flat, subrectangular plates, irregularly arranged. They show the same tendency to grow smaller dorsally. There is no possibility of the caudal scales just described being those of a regenerated tail, because the vertebral column continues behind the patch of scales in question. It is doubtful if the dorsal scutes are indicated in the fossil, and in the regenerated portion of the tail they are small and insignificant. The scales of the neck region are smaller, and a little more circular and stud-like than those of the tail.

Turning once more to Broili's description of the dermal ossicles on the upper surface of the fore and hind limbs of Homoeosaurus, it should be noted that they are tubercular scales or bosses and not flat plates. This is a feature that almost all orders of reptiles show to a greater or less degree, depending on their habitat. Those that live in a country

of xerophytic vegetation have the bosses thicker and heavier than those adapted to moist, tropical forests or to a semi-aquatic life. These scales, of course, serve as a protection in crawling through spiny vegetation. Even in forms where this type of protection is much reduced, there is always a contrast between these thicker, boss-like scales and the finer squamation of the sides of the body. Uromastix, Ctenosaura, to say nothing of many desert-loving tortoises, are good examples of this.

Sphenodon has a few of such small bosses arranged in rows. However, due to the imperfection of Broili's specimen in this respect, it is impossible to tell whether or not they were more extensively developed than in Sphenodon or whether they were similarly arranged.

The rest of the body of Homoeosaurus evidently had none of the spiny scales of Sphenodon. The squamation consisted of the simple subrectangular plate or tubercle with some variation in size. This type is found on the sides and back of Sphenodon between the spiny scales and also on some of the more primitive Geckos.

The squamation points to a similarity of habits and environment between Homoeosaurus and Sphenodon. It probably was not aquatic as von Meyer postulated, and its presence in a lagoon formation can be accounted for in a variety of ways.

It is not common to trace so clear-cut an instance of reversion from a living to a fossil animal and it is particularly convincing in the case of a form like Sphenodon. This animal is the most primitive living reptile. The family has come down from the Jurassic practically unchanged. Presumably, therefore, there are fewer intermediate steps to confuse the record than in some more highly specialized forms. In the more specialized orders reversion is probably not carried back the whole way, but in the more primitive it appears to be complete.

Korschelt in his recent book (1927) on Regeneration and Transplantation concedes but a paragraph to the assumed atavism of the regenerated portions of the lizard's tail, whereas Werner (1896) gives a long résumé of the occurrence of regenerated tails and feels certain of the fact of recapitulation. The difference of attitude between these two men is the difference of point of view between the laboratory worker who views the reptile as a homogeneous type represented in his mind perhaps by the one laboratory animal which once he examined, and the systematist who has perhaps observed in the field enormous numbers of individual reptiles, and who has studied and handled perhaps some thousands of species representing all of the families. The one feels naturally skeptical and inclined to conclude that the sys-

tematist has not made out much of a case. His utmost concession is a Scotch verdict of "not proven." The other, if candid, admits that what he has in reality is but a conviction based on a long series of impressions which cannot help but produce the accumulative effect of conviction. It will be no surprise, therefore, to those who have worked on large collections to find us putting forward what we now believe to be perhaps the first, and at any rate an extraordinarily convincing, bit of evidence showing a striking similarity of the squamation of the regenerated tail in a young specimen of the most primitive living reptile to an undoubted ally of Jurassic age. The whole subject is one on which a deal might be written, all perforce based on speculation. A bit of proof of the sort which we now present is found but by the rarest good fortune.

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EXPLANATION OF PLATE

PLATE

Fig. 1. Homoeosaurus maximiliani von Meyer, dorsal view ¾ natural size.

Fig. 2. Postsacral patch of skin x 4. Printed with posterior region toward top of page.

Fig. 3. Sphenodon punctatum (Gray). Ventral view of reproduced tail of young individual natural size.

Fig. 4. Lateral view of same natural size.

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AT HARVARD COLLEGE.
Vol. LXIX. No. 5.

COLOR CHANGES IN TWO CUBAN LIZARDS

By Charles E. Hadley

CAMBRIDGE, MASS., U. S. A.:
PRINTED FOR THE MUSEUM.
February, 1929.

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OF THE

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AT HARVARD COLLEGE.

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AT HARVARD COLLEGE.
Vol. LXIX. No. 5.

COLOR CHANGES IN TWO CUBAN LIZARDS

By Charles E. Hadley

CAMBRIDGE, MASS., U. S. A.:
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February, 1929.

No. 5.— *Color Changes in Two Cuban Lizards*

By Charles E. Hadley

Our present knowledge of the factors which influence color changes in lizards of the genus *Anolis* has been derived mainly from experiments conducted with animals subjected to laboratory conditions During the course of such experiments it becomes evident that the animals under observation are often so affected by their unnatural environment and by the handling involved in the experiments that their reactions to such factors as differences in light intensity and temperature are variable It is therefore desirable that experiments of this type be repeated in the field where the animals in question may be observed under more natural conditions.

A grant from the Atkins Fund made it possible for the author to spend a part of the summer of 1928 at the Harvard Biological Station at Soledad, Cuba, where a study was made of color changes in a number of native lizards

Preliminary field observations showed that a number of Cuban lizards undergo definite color changes. Indeed, so consistently are color changes seen in lizards of the genus *Anolis* that one is led to suspect that it is a characteristic of the group. Color changes are especially marked and easy of observation in the two species, *A. porcatus* Gray and *A. equestris* (Merrem). In each of these forms there is a change from dark brown to bright green or the reverse as factors governing these changes are modified Moreover, in *A. porcatus*, most males are marked, while in the light state, by a brilliant blue on the head and anterior trunk, a fact which makes them easy to distinguish from the females which are a uniform green in the light state These two forms, *A. porcatus* and *A. equestris*, served as material for the experiments described below.

Experimental procedure was of three types as follows: (1) study of color changes in animals observed while free in their natural environment; (2) study of color changes in animals confined in individual wire cages and similar observations of groups of individuals in larger wire cages in the laboratory; (3) study of color changes in animals confined to the branches of trees by long pieces of cotton thread.

In experiments involving *A. porcatus*, the stock was renewed about once a week and confined animals were supplied with fresh water and were occasionally fed.

Color Changes in *Anolis porcatus*

(1) Free individuals:

Anolis porcatus is most commonly seen about Soledad on the trunk of the Royal Palm. On a sunny day it is not uncommon to see a male *A. porcatus* on two out of every three trees observed. As a rule these animals perch high on the tree trunk just below the lowest branches with their heads directed downward. The females are seldom seen on the palms but are commonly observed running over vines and hedges. Two facts regarding the occurrence and color of the males are significant. Rarely does one see more than one male on a single tree and these solitary males are almost invariably in the light state (i.e. green). Only rarely did the author see a male free in nature showing a dark brown color. The females, on the other hand, are as often brown as green wherever they may be found. It may be significant that the few brown males encountered were perching motionless with the entire length of their bodies parallel with the tree trunk while the more common blue and green males invariably were noticed to have assumed an alert position with heads raised and commonly with their dewlaps extended. Occasionally male and female were seen scrambling up and down a tree trunk like a pair of squirrels. Such a preliminary to mating usually involves a female in the brown state and invariably involves a male in the green state. The probable significance of these observations will be discussed in a later paragraph where an attempt will be made to correlate them with observations made upon laboratory animals.

(2) Individuals confined in the laboratory:

For the most part, changes in coloration of *A. porcatus* when confined in wire cages in the laboratory may be correlated with variations in illumination. During daylight hours, a majority of the animals remain dark brown but at nightfall they assume the light state and remain green until just before sunrise. Observations made just after sunset and immediately before sunrise show that *A. porcatus* is remarkably sensitive to slight variations in light intensity, for the green state is assumed only when the last light fades, and the brown state is regularly apparent with the first faint light of the rising sun. These conditions obtain when the temperature is between 70° F. and 90° F. and allow of imitation by alternate transfer of the animals to and from a light-tight dark box. When placed in the dark, the animals become green in 15–18 minutes and they turn brown again within the first minute of subsequent exposure to diffuse daylight. These results with

A. porcatus are consistent with reactions of *A. carolinensis* to light as reported by Carlton (1903), except that the reaction time is shorter in the former.

It was noted that all animals in any one of the cages did not conform with the general rule just stated above. One or more individuals invariably assumed the light state and maintained it during a period of several hours when the diffuse light and moderate temperature of the laboratory induced the brown state in the other animals confined to the same cage. Moreover, it was noticed that most of the "recalcitrant" individuals were adult males.

Careful watch of the animals involved showed that the green state in such individuals was to be associated with one or the other of two factors. First, several of the larger and more mature males exhibited constant jealousy toward one another and this jealousy led to frequent skirmishes around the cage. Under such conditions, the males either remained brilliant blue and green in color or flushed green suddenly at the moment of encounter. That this behavior represented a state of excitement was easily demonstrated by isolation of the males in question to individual cages where the same conditions of temperature and illumination led to almost constant maintenance of the brown state during the remaining daylight hours. The second factor contributing to the green state was observed in cages where mature males were confined with females. Many of the males perched quietly on the sides of the cage throughout the day but here and there a mature male sought a mate. As is true with other lizards, the male *A. porcatus* courts the female by a vertical bobbing of the head and by repeated extension of the dewlap. During this period, the males invariably assume the light state, this coloration being undoubtedly the result of the emotional state of the animal and quite independent of other factors. The female may or may not assume the light state during the courting period, usually not. If a pair is watched from this time until copulation is completed, another interesting fact may be observed. At the onset of copulation, the female is usually brown and remains brown throughout, while the male is usually green for the first few minutes of copulation, turns brown and remains in the dark state for the remainder of the copulation time, in some cases more than an hour.

(3) Captive animals in a natural environment:

In order to imitate natural conditions more closely than was possible in the laboratory and to still be able to follow individuals through several days of observations, long strands of cotton thread were used to

tether animals in the branches of trees in the laboratory grounds. Some animals were secured in positions where escape from direct sunlight was impossible, while in other cases the captive was allowed to choose between sun and shade. These animals were observed hourly from 6.00 A.M. to 10.00 P.M. for a period of several days and records kept of the illumination, temperature, and the color of the skin. It was found that most animals ceased to struggle after a few hours and either perched on a branch or crawled about much as individuals do when free.

In most instances, animals in this group showed color changes very similar to those observed in laboratory animals. They remained brown in diffuse daylight but, with the coming of darkness, turned green. When observed with a flashlight by starlight at 5.30 A.M., all animals were green, but with the first light of sunrise, all animals turned brown. Similarly, the brown state persisted until after sunset when the green state was again assumed just as darkness came on.

When one of the tethered animals remained for any great length of time in bright sunlight, either from choice or necessity, the animal almost invariably remained in the light state. Such a reaction admitted of two possible explanations. It seemed possible that in such cases the light state might have been induced either by high light intensity or by high temperature. The use of a thermometer hung on the branch where such animals perched showed that this condition was a temperature effect for, when the animal crawled from direct sunlight to near-by shade, where the temperature was only slightly lower, the green color persisted in a majority of cases. When a sudden shower drenched the animal, however, the brown state was assumed and persisted for some time after the return of direct sunlight. Presumably both the animal and the surrounding air were cooled by rain and only after a considerable lapse of time was the temperature again high enough to induce a return of the light state.

The above account describes reactions of solitary animals but does include changes observed in cases where several animals were tethered near one another on the same tree. It was noticed that the appearance of a second male excited a first male and often both males became green and even sought to attack each other. The appearance of a female in the proximity of a male in the brown state usually led to a similar color change and to the head nodding and dewlap extension indicative of courtship.

Discussion

It is obvious that *A. porcatus* reacts to light and temperature in a manner very similar to *A. carolinensis* (Carlton, 1903) and (Parker and Starratt, 1904). At moderate temperatures, diffuse daylight induces the brown state and an absence of light induces the green state, while at high temperatures the animals are persistently green. It is also evident that these simpler reactions to light and temperature are often complicated by the emotional state of the animals under observation. Alarm, jealousy, or the sexual instinct cause an animal to assume the light state, thus masking light and temperature effects. This explanation may account for differences in coloration among a group of lizards confined in a single cage and exposed to identical conditions of light and temperature. It is probable that the prevalence of the light state in *A. porcatus* observed free in nature admits of a simple explanation somewhat as follows. Animals which frequent tall palms are seen easily only when they emerge from the foliage and perch on the tree trunks. Here the heat of bright sunlight induces the light state. It is quite possible that the heavy shade of the palm leaves may be cool enough to bring about the dark state but, in such situations, the animals are rarely visible.

Strecker (1928) records a number of observations made in the field concerning color changes in *A. carolinensis*. A comparison of Strecker's observations with those made by the author of this paper in studying *A. porcatus* show the reactions of the two forms to be consistent. In connection with the point made in the last sentence of the above paragraph, it is interesting to note that Strecker found that lizards encountered in the open were at first yellow-brown, then became green when pursued, and were finally taken from deep shade in a dark brown state. Although Strecker does not specify, it is probable that these animals were in deep shade long enough to allow the lower temperature of such an environment to induce a change from the light state which accompanies excitement to the brown color occasioned by low temperatures. In another instance Strecker noted the fact that a number of individuals collected in March exhibited "inability or unwillingness to change color." This he attributed to the effects of long hibernation but it is probably due, in part, to the low temperature of that season of the year.

It is also of interest to compare the times required for changes of color in *A. porcatus* and *A. carolinensis* resulting from confinement in a dark box and subsequent exposure to diffuse daylight. Carlton (1903),

using *A. carolinensis* which were far removed in time and space from their natural environment, found that this species became green after twenty-four minutes in a dark box and assumed the brown state four minutes after being later exposed to diffuse daylight. The author of this paper, using *A. porcatus* freshly collected and confined in a laboratory where natural conditions of moisture and temperature must have been nearly natural, found that corresponding changes in coloration required but eighteen minutes and one minute respectively. Whether these differences are the result of differences in the environment in the two cases or differences in the natural reaction times of the two species is not clear.

Color Changes in *Anolis equestris*

Unfortunately *A. equestris* is not common about Soledad and none of these lizards were observed free in nature. Five individuals in all were brought in by native boys and these were studied while confined in laboratory cages.

A. equestris has a change of color ranging from very dark brown to a brilliant green. Males and females are not markedly different. Twenty minutes' confinement in a dark chamber suffices to induce the green state at moderate temperatures and subsequent exposure to diffuse daylight for one minute causes a resumption of the brown state. Ordinarily, however, *A. equestris* is green in diffuse daylight. Apparently the lowered intensity of diffuse daylight in the laboratory is insufficient to bring about melanophore expansion and the brown state is only brought about under such conditions after previous sensitization in a dark chamber. Occasionally, exposure of *A. equestris* to bright sunlight induces the brown state but, in the course of a few minutes, the animal usually turns green again. This is probably the effect of temperature mentioned above in connection with similar experiments with *A. porcatus*. Preliminary experiments with *A. equestris* led to the conclusion that color changes in this species were similar to those seen in *A. porcatus* except that *A. equestris* seemed to be less sensitive to low light intensities. Excitement, which appeared as an important factor in the color changes of *A. porcatus*, did not at first seem to be involved in the color changes of this form. Careful watch, however, did show that some factor was superimposed upon the factors of light and temperature, for color changes occurred repeatedly and rapidly in cases where changes of light and temperature were not appreciably altered. It was found that male and female animals confined in a cage together

would remain green persistently for hours and then one or both would suddenly flush brown and then green. Isolated animals did not show this tendency if left undisturbed but if the observer approached the cage ever so cautiously and remained quietly by the cage a singular change occurred. The animal changed slowly from green to brown and remained in the brown state as long as the observer was near. When the observer withdrew, however, the animal usually turned green again. If the animal is removed from the cage while in the brown state and is held so as to cause it to struggle the color of the skin becomes bright green. Apparently, mild excitement causes melanophore expansion, while a higher degree of excitement induces melanophore contraction. Without further experimentation, it is impossible to conclude whether this reversal of the state of coloration in *A. equestris* is controlled by hormones, a special type of innervation, or both. It was further noted that no factor except very low temperature would induce the brown state after nightfall.

Discussion

Like *A. carolinensis* and *A. porcatus*, *A. equestris* assumes the green state in darkness and turns brown when later exposed to diffuse daylight. Unlike the other two species, however, *A. equestris* does not ordinarily become brown in diffuse daylight unless previously sensitized. Like *A. porcatus*, *A. equestris* is persistently green when highly excited but, under mild excitement, it assumes the brown state.

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AT HARVARD COLLEGE.
VOL. LXIX. No. 6

71,846

SOME RECORDS AND DESCRIPTIONS OF NEW FRESH-WATER MOLLUSKS FROM CAMEROON

BY WILLIAM J. CLENCH

WITH ONE PLATE.

CAMBRIDGE, MASS., U. S. A.:
PRINTED FOR THE MUSEUM.
MARCH, 1929

PUBLICATIONS

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY

AT HARVARD COLLEGE.

There have been published of the BULLETIN Vols. I. to LIV., LVI. to LXVIII.; of the MEMOIRS, Vols. I. to XLII., and also XLIV. to XLIX., and LI.

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MAR 15 1929

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SOME RECORDS AND DESCRIPTIONS OF NEW FRESH-WATER MOLLUSKS FROM CAMEROON

By William J. Clench

With One Plate.

CAMBRIDGE, MASS., U. S. A.:
PRINTED FOR THE MUSEUM.
March, 1929

No. 6.—*Some Records and Descriptions of New Fresh-water Mollusks from Cameroon*

By William J. Clench

The following descriptions and records are based upon a small collection of fresh-water mollusks received from Mr. George Schwab, a school teacher residing at Sakbayeme, about fifty miles northeast of Edia, Cameroon.

MELANIIDAE

Potadominae

Potadoma freethii guineensis (Reeve)

1860 *Melania guineensis* Reeve, Conch. icon., **12**, Melania, pl. 20, fig. 142.
1927 *Potadoma freethii guineensis* (Reeve), Pilsbry and Bequaert, Bull. Am. mus. nat. hist., **53** (2): p. 275.

A single specimen from the Sanaga River, near Sakbayeme, the apex badly corroded, measured: length 48, width 20, ap. length 20, ap. width 12.5 mm.

Several specimens from Kribi. First two or three whorls of the spires corroded away.

Goodrichia, gen. nov.

Shells imperforate, of solid structure, trochiform or conoid in general outline, possessing a radula about equal in length to the greatest diameter of the shell (*G. trochiformis*). Obtusely carinated with a very minute granulose or striated sculpture caused by interruptions in the fine spiral and incremental growth lines. Inner marginal teeth of radula with two supporting plates, one on each side, with outer plate below.

Genoholotype: *Goodrichia trochiformis.*

This genus differs from *Potadoma* by its entirely different shape and by possessing an exceedingly long radula. Proportionately the radula is approximately 35% greater. Comparative figures are:

Potadoma panthiervillensis spoliata (D. and P.)

Radula 8.5 mm., shell width 11 mm.

GOODRICHIA TROCHIFORMIS Clench (Holotype)

Radula 27 mm., shell width 26 mm.

Goodrichia differs from *Rhinomelania* E. v. Martens, by having the basal portion of the aperture rounded or flattened by a second carina and not produced into a well-defined canal. *Goodrichia* also differs materially in shape and in the possession of well-developed carinae. The radula of *Rhinomelania* is unknown.

GOODRICHIA TROCHIFORMIS, sp. nov.

Plate 1, figs. 3–4

Shell: imperforate, solid, broadly and obtusely carinate. Color, dark brown to dark olivaceous brown, with darker fine irregular axial streaks. Whorls angular, probably 5 or $5\frac{1}{2}$ (all specimens heavily corroded). Spire broadly tapering. Aperture obliquely quadrate. Palatal lip simple, thin. Parietal lip thinly but evenly callousecl. Columella heavy, irregularly curved to slightly angulate. Sutures slightly impressed, whorls joining along inferior margin of obtuse carina. Sculpture of fine spiral striae made granulose by the interruptions of the growth lines.

Radula: exceedingly long but otherwise similar to that of *Potadoma* as figured by Pilsbry and Bequaert (1927, p. 272, fig. 45) except for an additional supporting plate on the inner marginal tooth and a single rather than a bifurcated ectocone on the lateral tooth.

Formula

$$\left(\frac{1}{2+1}+\frac{1}{2+1}\right)+\frac{1}{1+1+2}+\frac{1}{3+1+3}+\frac{1}{2+1+1}+\left(\frac{1}{1+2}+\frac{1}{1+2}\right)$$

Length of radula: 27 mm., width 1 mm. (holotype).

Measurements of Shell

Length	Width	Ap. Length	Ap. Width		
31.5	26	18	12	mm.	Holotype
30.5	24	18	12.5		Paratype
29	26	18	12		"
29	25.5	20	12		"
31	24	16	10		"

Type locality: Man River, near Sakbayeme.

Holotype: M. C. Z. 78,066. *Paratypes:* M. C. Z. 78,067, 78,068 and 78,071.

GOODRICHIA TROCHIFORMIS PILSBRYI, subsp. nov.

Plate 1, figs. 5–6

Similar to *G. trochiformis* in its general character, differing from that species in being narrower, and of a lighter color.

This is only tentatively placed as a subspecies; additional material may indicate that it is of specific standing.

Measurements of Shell

Length	Width	Ap. Length	Ap. Width	
26	18.5	14	9.5 mm.	Holotype
27	18.5	14.5	10	Paratype
25.5	16	13.5	9	"
25	16	13	8.5	"
21	16	12	8.5	"

Holotype: M. C. Z. 78,073. *Paratypes:* 45,009; Sakbayeme.

Length measurements here only consider the present length of the shell, as 4 or 5 mm. have been lost through corrosion.

G. C. Spence (Journ. conch., **18**, no. 7, p. 215) has described and figured *Potadoma nyongensis*, a species which has the general appearance of a *Goodrichia*. Its strongly developed marginal carinae, more or less flaring aperture and quite distinctive shape seem to place it here rather than under *Potadoma* proper. Though *Goodrichia* has been separated from *Potadoma* in part upon the exceedingly long radula, shell characters as well are quite different from that genus.

RHINOMELANIA v. Mart.

Pilsbry and Bequaert (op. cit., p. 248) tentatively placed this genus in the Potadominae. A single specimen only is contained in the collection made by Schwab. Nothing additional can be added to the relative position of this genus, as the specimen considered here is without operculum or any soft parts. Specifically, it seems to be quite different from *Rhinomelania zenkeri* v. Mart.

Genoholotype: *Rhinomelania zenkeri.*

RHINOMELANIA AFRICANA, sp. nov.

Text fig. 1

Shell: imperforate, not carinate, rather globose, slightly shouldered. Color dark reddish brown. Whorls $3\frac{1}{2}$ (remaining) regularly increasing

in size, rounded, the last shouldered, increasingly toward the aperture. Early whorls corroded away; a complete shell would probably have five or six whorls. Aperture rather oblong, its long axis forming an angle of about 45% with the axial line. Palatal lip simple, thin. Parietal lip very slightly thickened. Columella nearly straight. Sutures well defined. Sculpture of very fine cross striae. Body whorl slightly malleated. Canal angled with the axial line.

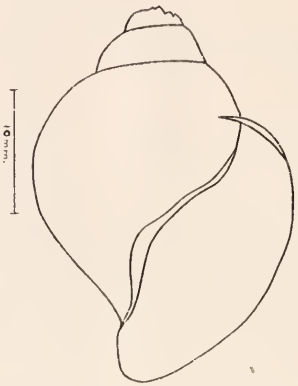


Fig. 1. Rhinomelania africana Clench. Holotype.

Length 30, width 20, ap. length 20.5, ap. width 11 mm.

The length given here does not include the loss of at least 4 mm. through corrosive action. The aperture length includes the canal as well.

Holotype: M. C. Z. 15,794. Kribi.

The species differs from *R. zenkeri* by having rounded and not flattened whorls. The canal is decidedly angled towards the axial line and not straight and continuous with the columella, as it is in *zenkeri*. *R. africana* is smaller than *zenkeri* though their proportional measurements are about the same.

AMPULLARIIDAE

Lanistes (Lanistes) sanagaensis, sp. nov.

Plate 1, figs. 7–8

Shell: sinistral perforate, rather solid, though not thick or heavy in structure. Color dark yellowish brown, faintly banded by dark brown along superior border of body whorl (holotype). Four well-marked

brownish bands on another specimen (juvenile). Whorls strongly shouldered, the shouldered area flat and at 90° with the axial line. The edge of the shoulder marked by a very slight elevated ridge. Spire not greatly produced, badly corroded. Aperture ovate. Palatal lip thin, simple. Parietal lip only thinly calloused. Columella thin. Sutures well marked and formed at almost right angles by the whorls and shoulders. Sculpture of rather prominent growth lines interposed with very fine axial hair lines. No spiral sculpture.

Measurements of Shell

Length	Width	Ap. Length	Ap. Width	
40.5	41	31	19.5 mm.	Holotype
28	29	20.5	14	Paratype

There is a probable loss of some 5 mm. in length due to the corroded spires.

Holotype: M. C. Z. 78,064. *Paratype:* 78,065; Sanaga River, near Sakbayeme.

This species of *Lanistes* seems to be quite different from any heretofore-described species from West Central Africa. It is a member of the carinate group, the carinae here reduced to a single but well-developed shoulder ridge. It is larger and more depressed than *L. libycus* (More), and from *L. subcarinata* Sby. by possessing a single rather than double or more carinae. In general shape it is similar to *L. congicus* Btg. as figured by Pilsbry and Bequaert (loc. cit., pl. 18, fig. 12), but differs in its larger size, different banding and in lacking entirely the spiral sculpture of that species.

DONACIDAE

Egeria paradoxa hermaphrodita (Gmel.).

1791 *Venus hermaphrodita* Gmelin, Syst. nat., 13th ed., **1** (6), 3278
1927 *Egeria paradoxa hermaphrodita* Gmelin, Pilsbry and Bequaert, Bull. Am. mus. nat. hist., **53** (2), 368.

Several specimens of this species were obtained in the Sanaga River at Lobetal "just beyond tide water." This locality is approximately twenty-five miles up stream from the coast.

The periostracum of young specimens is light brownish yellow in coloration, turning to dark brown in the adults. Radial lines may or may not be present. These vary in width from fine thread-like lines to stripes increasing in width towards the margins of the valves. When

present, there is no regularity as to spacing and they vary in number on both valves of the same specimen. These radial stripes are purplish in color, the color is impregnated into the prismatic layer of the shell, and not in the periostracum. The stripes are covered inside of the valves by the nacreous layer and are exposed only along the margin. Muscle scars, palial line and basal areas of the cardinal teeth occasionally tinged with purple.

Measurements

Length	Height	Diameter
88	74	45 mm.
80	63	38.5

EGERIA SCHWABI, sp. nov.

Plate 1, figs. 1–2

Shell: triangular, thin and smooth, two faint rays running from the umbones to the margin on the posterior half. Periostracum greenish yellow, thin but firm and inclined to scale off. Superficial coloring of periostracum olivaceous green due to the purplish coloration of the shell beneath. Beaks high, nearly central and directed posteriorly. Nepeonic shell very well defined, and colored dark purplish brown. Hinge plate strongly developed, supporting a bifed median cardinal tooth on the right valve, as well as a small accessory lateral tooth on the posterior margin. The left valve possesses two well-developed diverging cardinals with a narrow, thinly formed intermediate tooth. The right valve possesses a single, short, flat conic lateral tooth. Beak cavities deep.

Measurements

Length	Height	Diameter
41	33	24 mm.

Holotype: M. C. Z. 78,072; Lobetal, lower Sanaga River.

E. schwabi differs particularly from other species of the genus by its thinness. There is only a slight internal thickening in the form of a broad flat ridge that extends from the anterior side of the beak cavity. This broadens and thins out entirely at the margin.

In outline it approaches *E. paradoxa hermaphrodita,* but differs from that species in its much darker color, its thinness and much smaller hinge plate area. The purplish coloration of the interior is impregnated

in the prismatic layer of the shell, the mottled appearance due to slight and uneven deposits of the inner layer of shelly material. This purplish coloration is also responsible for the olivaceous appearance of the brownish yellow periostracum.

MUTELIDAE

Mutelinae

Aspatharia sinuata (E. v. Martens)

1883 *Spatha sinuata* E. v. Martens, Sitz. Bev. Ges. Naturf. Fr. Berlin, p. 73; 1885, Conchol. Mitth., **2** (5–6), p. 190, pl. 34, figs. 5–6.

1927 *Aspatharia sinuata* (E. v. Martens), Pilsbry and Bequaert, Bull. Am. mus. nat. hist., **53** (Art. II), p. 417, pl. 35, figs. 1–4, pl. 36, figs. 1–3a.

Muge River, north of Sakbayeme (tributary of the Man River, which is a tributary of the Sanaga River.

A series of five specimens which agree in all details with the description of this species by Pilsbry and Bequaert (1927, op. cit.); no details of beak sculpture were obtainable as the umbonal areas were badly corroded. Measurements for three of the five that were obtained alive are here given.

Length	Height	Diameter
72	33.5	26 mm.
65	31	22.5
65	32	24

EXPLANATION OF PLATE

PLATE 1

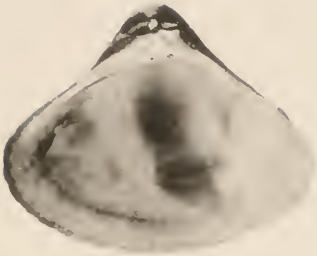
Figs. 1–2. *Egeria schwabi* [1] Clench. Holotype
Figs. 3–4. *Goodrichia* [2] *trochiformis* Clench. Holotype
Figs. 5–6. *Goodrichia trochiformis pilsbryi* [3] Clench. Holotype
Figs. 7–8. *Lanistes sanagaensis* Clench. Holotype

[1] In honor of George Schwab, the collector.

[2] In recognition for the considerable work done by Calvin Goodrich on fresh-water malacology.

[3] Named after H. A. Pilsbry who has added materially to our knowledge of African mollusks.

1



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Bulletin of the Museum of Comparative Zoölogy

AT HARVARD COLLEGE

VOL. LXIX. NO. 7

VERTEBRATES FROM THE CORN ISLANDS

INTRODUCTION, BY JAMES L. PETERS

MAMMALS, BY GLOVER M. ALLEN

BIRDS, BY JAMES L. PETERS

REPTILES AND AMPHIBIANS, BY THOMAS BARBOUR AND ARTHUR LOVERIDGE

CAMBRIDGE, MASS., U. S. A.:

PRINTED FOR THE MUSEUM

APRIL, 1929

No. 7.— *Vertebrates from the Corn Islands*

INTRODUCTION

By James Lee Peters

The Corn Islands have always been *insulae incognitae* to zoölogists, although it is difficult to imagine why, since they lie practically outside the hurricane belt and only a forty-mile sail from the nearest port on the Central American mainland. Nevertheless their distinct faunal possibilities have aroused much conjecture, and the authorities at the Museum of Comparative Zoölogy were not the only ones who for many years had contemplated sending a field party there.

Accompanied by Mr. Edward Bangs of Boston, I sailed from New Orleans 3 December, 1927 on the Cuyamel Fruit Company's S. S. *Rama,* Captain Pedersen, and after an uneventful passage dropped anchor in Great Bay, Great Corn Island, at three o'clock in the morning of 10 December. A ship's boat was lowered, into which we placed our baggage and then took our places, after which the boat under the second officer of the *Rama* and guided by a small dugout canoe paddled by two islanders who had come off to meet us, skirted the edge of a reef and nosed safely in on the sandy beach. I take this opportunity to express my appreciation of Captain Pedersen's seamanship in skillfully taking his vessel close in to a strange shore at night without lights to guide him, drop anchor, land his passengers and be on his way again in less than an hour.

The Corn Island group, if two islands may be said to comprise a group, lies in the western Caribbean Sea between latitude 12° 7′ and 12° 18′ N. and longitude 82° 58′ and 83° 4′ W. They are distant about forty miles in a E.N.E. direction from Bluefields, Nicaragua, and thirty miles from the nearest point on the mainland. That they are situated on the continental shelf is amply attested by the shallowness of the water between them and the mainland, a maximum depth of only eighteen fathoms being shown on the U. S. hydrographic office chart.

Great Corn Island is about two and one half miles long by two miles wide, roughly triangular with its base to the north and its apex to the southwest. Its northern shore is protected by a reef, while the other two sides are open. There are two bays with sandy beaches to the westward, likewise the southeast shore is one long indentation; the tip to the southward presents rocky cliffs to the sea.

The highest point on Great Corn Island is Mt. Pleasant, 370 feet,

in the northeast central part of the island; the next highest point, Quinn's bluff, is near the southern tip and attains an elevation of 100 feet. Except for the rocky southerly extremity, the shore line is low and sandy. Immediately behind the beach lies a series of narrow lagoons and swamps almost encircling the island, behind which the land rises slightly.

There is no heavy forest on Great Corn Island today and quite probably there never was any. The lagoons are bordered with a thin fringe of mangroves; the shore from a little above high water mark to the lagoons is planted with coconut palms, and large groves of these trees are likewise to be found throughout the island. Coconuts are the chief product of the island. Most of the inhabitants also have a small piece of cultivated land, where their staple provisions are raised. The rest of the area is grown up with scrubby woodland.

The population consists of about eight hundred English-speaking colored people, the principal settlement being on the north side, with scattered huts found at intervals along the rest of the shore line; very few people live inland.

Little Corn Island lies about seven miles N.N.E. from Great Corn; it is much smaller, being only about a mile and a half long and half a mile wide, the long axis running from northwest to southeast. The northeast coast is rocky and reef-bound, the southwest is largely sandy and clear. Little Corn attains a maximum elevation of 125 feet on a hill which comprises the northwest portion of the island. Much of the interior was evidently open grassy savannah, now much overgrown with guava bushes. As on Great Corn, some groves of coconuts have been planted, and on the windward side, near the middle, is a large grove of almond trees.

A number of families from the "Big Island" own land on the "Little Island" and there cultivate small patches of ground, or graze horses and cattle on the savannah; the permanent population, however, is very small, consisting of not over a dozen persons.

Bangs and I remained on Great Corn Island, where we found suitable accommodations at Mrs. Jane Jackson's until 22 December, when we made the trip to Little Corn in the motor sloop *Caledonia*, taking with us a cook and provisions. On Little Corn we lived in an empty fisherman's shack until 28 December when the *Caledonia* returned for us and brought us back to Great Corn where we remained until 3 January, 1928. On that day we boarded the auxiliary schooner *Linda S.* and sailed on her to Limon, Costa Rica, arriving there without incident on the following morning.

The fact that the Corn Islands possess not only no characteristic avifauna, but are almost devoid of birds as well, proved a great disappointment. The birds are nearly all wide-ranging sea birds, or North American migrants. We were repeatedly told by the inhabitants that we had made our visit at the wrong season of the year, that October was the "bird month," from which I infer that the islands are visited by large numbers of North American migrants at that time, most of which apparently pass farther south.

The breeding birds of the Corn Islands are the Ani (*Crotophaga ani*), the Mangrove Cuckoo (*Coccyzus minor minor*), the White-crowned Pigeon (*Columba leucocephala*), possibly a coot (*Fulica americana*) and several species of Herons. The most significant facts are seen in the general distribution of the first three species noted. The White-crowned Pigeon is essentially Caribbean in its distribution, occurring in southern Florida and the Florida Keys, the Bahamas, Greater Antilles, northern Lesser Antilles, Swan Island, Old Providence, St. Andrews, Cozumel Island, the Bay Islands, islands off the coast of British Honduras, but occurring on the Central American mainland only as an occasional straggler to Yucatan and Panama. *Coccyzus minor* occupies a similar range, but occurs somewhat more generally on the mainland from Matamoros to the Amazon valley, it moreover has a Pacific coast representative ranging from northern Mexico to Costa Rica. The wide-ranging Ani does not occur on the Central American mainland north of Panama but has been recorded from Cozumel, Holbox, and Ruatan Islands. (The specimen recorded from Comayagua, Honduras by Sclater, P.Z.S. 1858, p. 359 should be reëxamined). The occurrence of *Dendroica discolor*, while of interest, is not of great significance, since there are few migrant species that do not have occasional stragglers outside the usual wintering range of the species as a whole.

MAMMALS

By Glover M. Allen

DIDELPHIIDAE

Marmosa mexicana zeledoni Goldman

A series of fourteen specimens seems referable to this form which is now regarded by its describer as a subspecies of *M. mexicana*. It is distinctly smaller than *M. m. isthmica* and paler on the sides, which are buffy, yet well defined from the whitish of the belly. Probably this

little opossum was brought from the adjacent mainland by boats passing to and from the islands. It seems to be the only native Central American species except the bat.

MURIDAE

Mus musculus Linné

The House Mouse is represented in the collection by a single specimen which is very blackish, perhaps an individual variant, or perhaps one of the dark Mexican race, *jalapae*.

Rattus rattus alexandrinus (I. Geoffroy)

One specimen of the introduced roof rat is like other Central American specimens, rather gray.

PHYLLOSTOMIDAE

Micronycteris microtis Miller

Four specimens were secured, the only bat taken. They seem typical of this species, originally described from Bluefields, Nicaragua. The forearm measurement is 35 mm.

BIRDS

By James L. Peters

Columba leucocephala Linné

"Pigeon"

The White-crowned Pigeon is a common resident on the Corn Islands. On Great Corn, Bangs and I found it pretty much all over the island, especially in the bushy interior, less frequent in the coconut plantations. On Little Corn there was less suitable cover for the bird, but it occurred rather numerously in some swampy woods on the windward side, and birds were also seen in flight over the pastures.

We saw two juvenals on Great Corn in the possession of some children who told us that they had taken them from a nest the previous October.

I can detect no differences that would serve to distinguish the resident White-crowned Pigeon of these islands from other points in its wide range.

Fulica americana americana Gmel.

"Moor-hen"

A flock of twenty to twenty-five Coot frequented a narrow lagoon on the westerly side of Great Corn Island. When undisturbed they fed and swam placidly in the centre of the pond, but were quick to take alarm, and when startled swam or pattered into the dense growth of bushes growing out into the water, and there remained until apparently all was safe again. A female was taken 12 December, three females 16 December and a male 29 December. Coot were not found on Little Corn Island, no doubt due to the absence of suitable locations.

The five specimens collected exhibit certain average differences that might make it necessary to separate the Coot from the Corn Islands from the North American birds, were it certain that the former was actually a resident insular form and not a winter visitor from North America. I believe that a separation under the circumstance would be inadvisable, especially since two of the birds are obviously immature, and the other three have not fully developed the character of the frontal shield, usually associated with birds fully adult.

Thalasseus maximus maximus (Bodd.)

"Crickum"

A small flock of Royal Terns was observed daily, perched on some rocks jutting from the north side of Great Corn Island. A male was secured 21 December. No terns were seen on Little Corn Island.

It is now necessary to employ trinomials for this bird by reason of the recognition of the race occurring on the west coast of Africa from the Straits of Gibraltar south to Angola, *Sterna maxima albidorsalis* Hart. (Vog. Pal. Faun. **2**, heft 9, 1914, p. 1698).

Larus atricilla subsp.

Two Laughing Gulls were seen from the deck of the *Caledonia* 22 December, while crossing from Great Corn to Little Corn Island. In the absence of specimens it is, of course, impossible to determine whether these birds were typical *atricilla Linn.*, the breeding form of the Caribbean region, or whether they were migrants of the larger race inhabiting North America, *megalopterus* Bruch.

Arenaria interpres morinella Linn.

Turnstones were noted several times on the windward side of Little Corn Island, between 22 and 28 December. On one occasion a compact flock of about a dozen individuals was seen.

Squatarola squatarola (Linn.)

Two Black-bellied Plover were seen on Great Corn Island between 10 and 22 December, both birds always found on a wide sandy beach on the western side. After our return from Little Corn Island we found that one of them had left, but the other was seen at the same spot each time that we passed by.

Oxyechus vociferus vociferus (Linn.)

Four Killdeer were seen daily about the house where Bangs and I stayed on Great Corn Island. A female secured 12 December on the sandy beach on the westerly side is typical of the North American form. On Little Corn Island several examples were seen at the eastern tip in small open grassy spots surrounded with guava bushes and beach grape.

Charadrius semipalmatus Bonap.

A flock of four Ring-necks haunted a small stretch of beach near the boat landing on Great Corn Island throughout the entire length of our stay. An immature female was taken there 12 December.

Ereunetes mauri Cab.

A single small Sandpiper, killed on the sandy beach on the west side of Great Corn Island 12 December, proves to be a female of this species in winter plumage.

Actitis macularia (Linn.)

Spotted Sandpipers were not uncommon on Great Corn Island. Single individuals were seen at intervals all along the shore and on the open borders of muddy pools. The species also occurred rather commonly on Little Corn Island, where it was observed along the beaches.

Capella gallinago delicata (Ord.)

In a small wet grassy spot, just back of a beach on Great Corn Island, a Snipe was seen on several occasions, and one day shortly before

our departure three were started from the wide muddy shores of a small lagoon.

ARDEA HERODIAS HERODIAS Linn.

"Crane"

We found Great Blue Herons only on the larger island; there were probably not over half a dozen individuals present.

CASMERODIUS ALBUS EGRETTA (Gmel.)

On the morning of 14 December we started an American Egret at the border of a grassy swamp and the upland just to the eastward of Broad Bay, Great Corn Island.

FLORIDA CAERULEA Linn.

"Gaulding; White Gaulding"

Little Blue Herons were found rather commonly on both Great Corn and Little Corn Islands. No specimens were secured.

I am unable to appreciate the difference claimed by Wetmore (Scientific Survey of Porto Rico and the Virgin Islands, **9**, p. 294, pt. 3, 1927) between Little Blue Herons from the United States and the West Indies, nor between specimens from these localities and central America and southern Mexico. In making my comparisons I have used only clean, well-made skins of adults in comparable plumages.

HYDRANASSA TRICOLOR RUFICOLLIS (Gosse)

"Gaudling"

We found Louisiana Herons only on Great Corn Island; several were noted feeding along the borders of the lagoon where the coot occurred, others were seen in a swamp near our stopping place.

Two females were taken 13 December; both are in the red-necked immature plumage, both agree in color and measurements with birds of the same sex and corresponding plumage taken in the United States, southern Mexico and Central America.

NYCTANASSA VIOLACEA VIOLACEA (Linn.)

"Carpenter"

A few Yellow-crowned Night Herons were seen on Great Corn Island, where two immature examples were obtained 17 December.

Butorides virescens maculatus (Bodd.)

"Mary Punkin Seed"

This species was surprisingly uncommon; it occurred only on Great Corn, where but three individuals were seen during the entire period of our stay. We saw one adult on several occasions but the bird was so shy that it could not be approached. Bangs shot an immature female 21 December. This specimen is unquestionably referable to the race inhabiting the West Indies and the east coast of Central America; the wing measures but 161 mm., the culmen 53 mm.

Nyroca affinis (Eyton)

"Wild Duck." "Teal"

A few lesser scaups winter on the lagoons of Great Corn Island. A total of seven individuals were seen, of which a female was collected 13 December.

Phalacrocorax olivaceus olivaceus (Humb.)

"Die-dapper"

Probably a total of not over five cormorants were seen on Great Corn Island, and but a single example on Little Corn. On the larger island one bird was usually seen perched on a little group of rocks just off the northern side; another fished in Great Bay, sometimes perching on the fronds of the coconut palms growing close to the water's edge; others were seen on the "coot lagoon," where an immature male was collected 13 December.

This specimen is without doubt referable to the typical form, although the wing is between the minima for *P. o. olivaceus* and the maxima for *P. o. mexicanus*. The culmen is longer than that of any examples of *olivaceus* that I have handled, in fact its length of 65 mm. suggests *P. a. floridanus*, but the latter possibility may be disregarded, since the character of the feathering on the lower edge of the gular sac is that of *olivaceus* and not *auritus*.

Sula leucogaster leucogaster (Bodd.)

"Booby"

At Great Corn Island, Brown Boobies were seen a few times flying a short distance off shore. On Little Corn about twenty birds, most of

them adults, came to roost nightly in some coconut palms whose tops overhung the water at the eastern tip of the island. An adult female was shot here 25 December.

Fregata magnificens rothschildi Math.

"Man-of-War bird"

The occurrence of this species as a Corn Islands bird is on a par with that of the foregoing species. Frigate birds were seen occasionally off the shores of the larger island and were found roosting for the night at the eastern end of the little island. An immature male was killed there 24 December; the following evening eight adults came in to roost, but before settling for the night flew about, inflating their red throat sacs.

The bird collected measures as follows: wing 603 mm.; tail 412 mm.; culmen 110 mm.

Pelecanus occidentalis occidentalis Linn.

"Pelican"

Pelicans were found commonly in the waters surrounding both of the islands. At Great Bay, the principal landing place on Great Corn, several could be found any time during the day, fishing within a few feet of the shore; these birds were absolutely fearless and paid no attention to passing canoes or to men working close at hand on the shore. On a small islet off the eastern tip of Little Corn, Pelicans came in to roost, and there were always a number present throughout the day.

Falco columbarius columbarius Linn.

"Fowl Hawk"

From accounts of the natives, hawks are numerous on the islands during the month of October, apparently North American species following the migration southward. On 14 December, I shot an old adult female from a tree in a clearing on Great Corn Island; another example was seen in flight near the settlement a few days later.

Falco sparverius sparverius Linn.

"Fowl Hawk"

Like the Pigeon Hawk, Sparrow Hawks also visit the Corn Islands during migration. We did not find the bird on the smaller island, but

secured two on the larger — a female 21 December and a male 30 December. Both birds agree in size and color with specimens from northeastern United States.

Pandion haliaëtus carolinensis (Gmel.)?

An Osprey was seen on three occasions circling over the water inside the reef off the northern side of Great Corn Island.

Megaceryle alcyon alcyon (Linn.)

"Kingfisherman"

The Kingfisher appears to be a fairly common visitor to the islands, a few being seen along the shores of both Great and Little Corn.

Coccyzus minor minor (Gmel.)?

"Rainbird"

Mangrove cuckoos are easily the most numerous of the few resident land birds on the Corn Islands. Twelve specimens were collected; seven on Great Corn, five on Little Corn.

The determination of this series has been beset with many difficulties, chief of which is the actual identity of *Cuculus minor* Gmel. (Syst. nat., 1, pt. 1, 1788, p. 411). The chief basis of Gmelin's name is the Coucou des Palétuviers de Cayenne, figured in Daubenton's Planches enluminées, plate 813. There seem to be no specimens from the northern coast of South America in the museums of this country, and I have been obliged to do as Ridgway did, that is to regard the birds of the eastern coast of Mexico and Central America as representing the typical form, although it is highly probable that they do not.

For comparison there have been available Daubenton's plate; a single unsexed specimen from Yucatan, two males from British Honduras for the loan of which I am indebted to the authorities of the Carnegie Museum, and a female from Costa Rica. There are also before me three Mangrove cuckoos from Swan Island; a single male *abbotti* from St. Andrews and a good series of the various West Indian races except *rileyi*, of which I have but one.

The races of *Coccyzus minor* fall into two categories, pale forms and more deeply colored forms, and each of these in turn divides into larger races and smaller races. There is, however, considerable range both in size and color among individuals belonging to the same subspecies, so to appreciate differential characters a large series is necessary.

Central American examples appear to belong to a small, rather deeply colored form. Daubenton's plate is also taken from a deeply colored bird, and if Gmelin's dimension of "12 pollices largus" is correct, it belongs to the small group also.

The Corn Island birds are all taken between the tenth and twenty-sixth of December, so the series shows little color variation. The general tone of the underparts is matched in two mainland examples; the measurements average larger, but this discrepancy I believe would tend to disappear were a larger series from the mainland to be examined. For these reasons I believe a separation is not warranted, until the constancy of the unusual characters can be proven. In any event they are in no way referable to the large pale *abbotti* of Old Providence and St. Andrews.

Three birds from Swan Island likewise present certain difficulties, but the skins are not seasonably comparable, so I refer them, provisionally at least, to *minor;* one of them was identified by Mr. Ridgway as *rileyi* (?)

In my opinion *uesiotes* from Jamaica is extremely close to *minor* (as understood here) differing chiefly in *averaging* less deeply colored below with a greater tendency toward the development of gray on the side of the chest and in having a shorter, relatively stouter bill.

Crotophaga ani Linn.

"Blackbird" "Cowbird"

Anis were found on both islands, but were by no means common. On Great Corn they occurred in small bands ranging up to five or six birds; on Little Corn a flock of four was seen in a clearing near the centre of the island. We found Anis rather wary here when compared with the tameness usually shown by this species in the West Indies.

Two females were taken on the larger island 19 and 30 December, and a third female on the smaller island 25 December.

Mniotilta varia (Linn.)

One was shot 24 December on Little Corn Island at the wooded borders of a small lagoon.

Dendroica coronata (Linn.)

"Ricebird"

The Myrtle Warbler winters abundantly all over the Corn Islands.

Dendroica discolor (Vieill.)

An immature female Prairie Warbler was shot on Great Corn Island 2 January, 1928. This species ordinarily winters in the West Indies; so far as I can ascertain it has never been recorded from the Central American mainland, though it is known in winter from Cozumel and Swan Island.

Seiurus aurocapillus (Linn.)

Two Ovenbirds were seen on Little Corn Island 24 December, and a male secured.

Seiurus noveboracensis (Gmel.)

This species was noted on three occasions in mangrove thickets or wet woods just back of the beaches on Little Corn Island. Whenever I have met with water thrushes in their winter home I have always found them exceedingly wild and restless, and these birds were no exception.

Geothlypis trichas brachidactyla (Swains.)

A female Northern Yellow-throat was taken 15 December at the edge of a swamp close by our boarding place on Great Corn Island.

Wilsonia citrina (Bodd.)

On 24 December I saw and satisfactorily identified an adult male Hooded Warbler in a wooded swamp near the windward shore of Little Corn Island; the bird was part of a small gathering of migrant North American Warblers consisting of a Black and White Warbler, a Water Thrush and a few Myrtle Warblers.

Several times on Great Corn I heard the call note of a warbler coming from a swamp, but was unable to *squeak* the bird into view; after hearing the call of the Hooded Warbler seen on the small island, however, I have little doubt that the same species was present on the larger island.

REPTILES AND AMPHIBIANS

By T. Barbour and A. Loveridge

Constrictor constrictor imperator (Daudin)

Boa imperator Daudin, 1803, Hist. nat. rept., **5**, p. 150.

A single specimen (M.C.Z. 26,951) measuring 1,208 (1,080 + 128) mm. and with a scale count of sc. 80; v. 246; a. 1; c. 55; l. 20. Five

rows of the subcaudals in the middle region of the tail are divided. There are 18 scales across the forehead from eye to eye and 17 in a ring round the eye. The color is somewhat paler, and the cross-bars on the anterior part of the body less distinct than in average *C. c. imperator* from the mainland, but not so pale, nor so reddish, as in the types of *C. c. sabogae* (Barbour) from Saboga Island.

Tretanorhinus nigroluteus Cope

Tretanorhinus nigroluteus Cope, 1861, Proc. acad. nat. sci. Phila., p. 298.

This snake (M.C.Z. 26,952), measuring 737 (565+172) mm., agrees in all its scale characters with typical mainland examples, of which a score from Honduras, Nicaragua and Panama are available for comparison. Its scale count is sc. 21; v. 142; a. 2; c. 63. Owing to the rostral having divided to give off an extra labial on the right side, there are 9 labials with the 5th entering the orbit; the left side has the normal 8 labials with the 4th entering the orbit. The posterior chin shields are separated from each other anteriorly (as in *variabilis*) but this is also the case with Canal Zone specimens, so little importance may be attached to this character. It has two loreals, the mainland snakes having one or two. It differs in being more melanistic than the continental examples for it is uniformly black above and reddish pink below, with two parallel dusky lines along the ventrals.

Drymobius margaritiferus (Schlegel)

Herpetodryas margaritiferus Schlegel, 1837, Essai physion. serp., **2**, p. 184.

The example (M.C.Z. 26,953) of this snake, collected by Peters, measures over 700 mm. but has lost the tip of its tail. It is quite typical, having sc. 17; v. 142; a. 2; c. ?; l. 9, the 4th, 5th and 6th labials entering the orbit.

Oxybelis acuminatus (Wied)

Coluber acuminatus Wied, 1822, Abbild. nat. Brasil (no page number) and 1824, Isis, pt. 6, p. 667.

Seven specimens (M.C.Z. 26,954–26,960) of the Pike-headed Snake are represented in the collection. All are of large size, the biggest measuring 1,790 (1,170+620) mm. They possess a scale formula well within the range of typical specimens, viz. sc. 17; v. 186–200; a. 2; c. 149–179 (two snakes with mutilated tails are omitted from this count); l. 9, the 4th, 5th and 6th entering the orbit.

One snake which has the remains of a lizard, apparently an ameiva, in its stomach, is infested with nematodes.

Micrurus nigrocinctus (Girard)

Elaps nigrocinctus Girard, 1854, Proc. acad. nat. sci. Phila., p. 226.

This coral snake is represented by a specimen (M.C.Z. 26,961) measuring 770 (690+80) mm. and with a normal scale formula, viz. sc. 15; v. 205; a. 2; c. 35; l. 7, the 3d and 4th entering the orbit. There are 23 more or less complete rings on the body and 6 more on the tail.

It is interesting to learn from Mr. Peters that the inhabitants of Corn Island informed him that there were no poisonous snakes there.

Thecadactylus rapicaudus (Houttuyn)

Gecko rapicauda Houttuyn, 1782, Verh. Zeeuwsch. genoot. wet. Vlissingen, **9**, p. 323, pl. 3, fig. 1.

A very handsomely marbled specimen (M.C.Z. 26,961) of this common Central American gecko.

Anolis rodriguezii Bocourt

Anolis rodriguezii Bocourt, 1870, Miss. scien. Mexique, Reptiles, p. 62, pl. 13, fig. 1.

An anole (M.C.Z. 26,963) from Great Corn Island appears to be specifically identical with examples of *A. rodriguezii* from Guatemala, whence came the type. Other examples in the Museum of Comparative Zoölogy were collected in the Guaymas District of the Republic of Honduras and on the Escondido River, Nicaragua.

Anolis sallaei Günther

Anolis sallaei Günther, 1859, Proc. zoöl. soc. London, p. 421.

Three undoubted examples (M.C.Z. 26,964–26,966) of this anole were collected by Mr. Peters; this record forms an interesting extension of its range. Originally described from Mexico, specimens from Guatemala were subsequently referred to it by Boulenger. The species is represented in the Museum of Comparative Zoölogy by both Mexican and Guatemalan examples, the latter collected last year by Messrs. Slevin and Anthony.

Iguana delicatissima Laurenti

Iguana delicatissima Laurenti, 1768, Syn. rept., p. 48.

A half-grown iguana (M.C.Z. 26,967) with very long nuchal and dorsal spines.

Ctenosaura similis (Gray)

Iguana (Ctenosaura) similis Gray, 1845, Cat. liz. Brit. mus., p. 191.

Two young iguanas (M.C.Z. 26,968–26,969), the larger measuring only 345 (100+245) mm., compare very well with examples of a similar size from the mainland. The series in the Museum of Comparative Zoölogy includes specimens from Honduras, Nicaragua, Costa Rica and Panama.

Ameiva festiva miadis subsp. nov.

Type. No. 26,970 Museum of Comparative Zoölogy, an adult male collected on Great Corn Island, forty miles off the Nicaraguan coast, by James L. Peters in December 1927.

Paratypes. Nos 26,971–26,975 with the same history as the type.

Diagnosis. Intermediate between *A. ruthveni* and *A. festiva*, agreeing with the former in having a group of enlarged (but not so large as in *festiva*) gular scales in the middle of the throat, and in its tibial shields which are in three rows, the innermost much smaller than the others. It agrees with *festiva* in having a lower number of femoral pores, in the scales on the wrist being subequal, none predominately enlarged and in the absence of the strongly spinose and enlarged lateral caudal scales which are so characteristic of *ruthveni*.

Description. Nostril in the lower posterior corner of the nasal (which is horizontally divided on one side in one paratype), nasals broadly in contact behind the rostral; postnasal resting on the 1st and 2d labials, in contact with the frontonasal, which is longer than broad; frontonasal in contact with the loreal (except in an old male where it is separated by the postnasal); praefrontals broadly in contact; frontal shield-shaped in contact with the 1st and 2d supraoculars only (separated from 1st supraocular by a small scale in one paratype; 3 supraoculars of which the 2d and 3d are in contact with the frontoparietal; 6 (5 to 7) supraciliaries of which the last 4 (or 5) are separated from the supraoculars by a single, or partly double, row of small granules; an interparietal as long as (or longer, or shorter) but slightly narrower (or broader) than the parietals; 8 or 9 (normally 7) enlarged supralabials; 7 (sometimes 6) large infralabials, the last four being separated by a

single or double row of small plates from the huge chin shields which are 7 (usually 8) in number; chin and throat covered with small scales increasing towards the centre to form a patch of 7 to a dozen large scales, there is a tendency toward a band of enlarged scales across the throat but not so pronouncedly so as in *ruthveni;* belly with 8 transverse and 30 (29 to 32) longitudinal rows of transversely enlarged rectangular plates; a pair of enlarged praeanal plates preceded by two more, one in advance of the other (no weight can be attached to this arrangement as each one of the paratypes presents a different one, these may be expressed as follows: $\frac{1}{1}$ $\frac{1}{1}$ $\frac{1}{1}$ $\frac{2}{1}$ $\frac{2}{2}$ 1, 1–2, 2, 2, 2), two rows of antebrachials, the larger outermost, two rows of brachials, the larger innermost, a patch of six transversely enlarged plates on the back of the upper arm (single or double but only one row strongly enlarged); on the tibia three rows of enlarged scales, the inner row much smaller than the other two; the lower side of the thighs with three or four rows of very much enlarged plates flanked by smaller ones, 21 (16 to 19 in paratype series) femoral pores; the outer and inner toes are of equal length when pressed together; tail covered with strongly keeled scales, the keels being slightly oblique dorsally, more pronouncedly so laterally.

Coloration. Above olive brown with irregularly transverse black bars, limbs and flanks banded and vermiculated with black and blue very much the same as in *ruthveni;* uniformly bluish-white beneath.

Measurements

Head and body	130 mm.
Tail	220 mm.
Hind limb	86 mm.
Longest toe (the 4th)	40 mm.

Parasites. Nematode worms were numerous in the stomach of the type.

Enemies. Remains of an ameiva, presumably this species, were found in the stomach of a Pike-headed Snake (*Oxybelis aeuminatus*).

Mabuya agilis (Raddi)

Scincus agilis Raddi, 1823, Mem. soc. Ital. modena, **19**, p. 62.

A single example (M.C.Z. 26,976) of this common mainland skink, which Mr. Peters informs us is called *slitch* by the islanders, is repre-

sented in the collection of the Museum of Comparative Zoölogy by specimens from Honduras, Costa Rica, Panama and elsewhere.

RANA MIADIS sp. nov.

Holotype. No. 14,847 Museum of Comparative Zoölogy. An adult female collected on Little Corn Island, forty miles off the Nicaraguan coast, by James L. Peters between December 23 and 27, 1927.

Relations. The nearest relative of this frog appears to be *Rana godmani* Gunther from Rio Sucio, Costa Rica, from which it appears to differ in several important points. We therefore submitted it to Mr. H. W. Parker for comparison with the three supposedly female cotypes of that species which are in the British Museum. Mr. Parker has examined the specimen very thoroughly and we take this opportunity of expressing our thanks to him for the trouble he has taken and for supplying us with the following table of differences which he compiled and which we quote verbatim.

Rana godmani Gunther	*Rana miadis* sp. n.
Vomers oblique, widely separated small.	Vomers transverse, juxtaposed, strong.
Canthus rostralis rounded but distinct.	Canthus rostralis indistinct.
Loreal region almost vertical, concave.	Loreal region very oblique, concave.
Tympanum not well defined at edges.	Tympanum very well defined.
3d finger very little (terminal phalanx longer than the 4th).	3d finger very distinctly longer than the 4th. (Two phalanges).
Tibio-tarsal articulation reaches to the middle or anterior border of the eye.	Tibio-tarsal articulation reaches the end of the snout.
Dorso-lateral fold very thick, almost "parotid-like" above the tympanum.	Narrow.
Light brown sparsely spotted with dark between the folds, a dark streak along the folds; flanks, inguinal region and thighs nearly immaculate.	Brown, profusely spotted, folds lighter; flanks, inguinal region and thighs heavily spotted and marbled.

Dr. E. R. Dunn, who has recently examined the type ef *Rana vibicaria* (Cope), tells us that he considers *R. godmani* Günther should be united with that species.

Description. Vomerine teeth well developed in two somewhat transverse juxtaposed groups between the choanae. Head flattened, longer than broad; snout somewhat pointed though rounded at the tip which slopes steeply from the nostrils, a little longer than the orbit; canthus rostralis rounded, scarcely marked, loreal region distinctly concave; nostril equidistant between eye and end of snout; interorbital space a very little narrower than the upper eyelid; tympanum very conspicuous, in size equal to two-thirds the diameter of the eye. Fingers well developed, first a trifle longer than the second, third much the longest, fourth a little longer than the first; toes long, webbed to the disks on the inner aspect of the first and second, one phalanx free on the third and fifth and three phalanges free on the fourth which is by far the longest toe, the third is a little longer than the fifth which is once and a half times as long as the second, first much the shortest; subarticular tubercles moderate, a large rounded inner metatarsal tubercle whose length is about equal to the two terminal phalanges of the adjacent first toe, an extremely indistinct tarsal fold. The tibio-tarsal articulation of the adpressed hind limb reaches to the end of the snout or beyond; length of the tibia rather more than half the length from snout to vent. Skin smooth above (such wrinkles as appear undoubtedly due to the method of preservation), a narrow dorso-lateral fold along each flank from the posterior border of the eye to the insertion of the hind limb.

Coloration in alcohol. Above, brown, vermiculated with darker; dorso-lateral folds lighter as also flanks where the darker brown blotches show up more conspicuously, the inner half of the tibia and foot (evidently concealed when at rest) clear white almost without markings of any kind. Below, white, stippled and mottled with brown.

Measurements of Holotype

Snout to vent	82 mm.
Length of head	30 mm.
Diameter of eye	9 mm.
Diameter of tympanum	6 mm.
Length of hind limb from anus	138 mm.
Length of tibia	47 mm.
Length of fourth toe	37 mm.

Parasites. A nematode worm was found free in the body cavity.
Enemies. Two fingers of the left hand are missing.

Bufo valliceps valliceps Wiegmann

Bufo valliceps Wiegmann, 1833, Isis, p. 657.

Four big toads (M.C.Z. 14,851–14,854) appear to run to a larger size on the island than do mainland examples, though the difference is not very marked; these four Corn Island toads range from 30 to 95 mm. in total length.

? Hyla miotympanum Cope

Hyla miotympanum Cope, 1863, Proc. acad. nat. sci. Phila., p. 47.

This tree frog (M.C.Z. 14,848), from Great Corn Island, was submitted to Dr. Remington Kellogg, who points out that it somewhat resembles specimens of the Mexican *Hyla miotympanum* in the collection of the United States National Museum; he suggests, however, that it would be as well to compare it with freshly preserved examples but as the species is entirely unrepresented in our collection we tentatively refer it to *miotympanum* without comparison.

Agalychnis callidryas (Cope)

Hyla callidryas Cope, 1862, Proc. acad. nat. sci. Phila., p. 359.

The two frogs (M.C.Z. 14,849–14,850) from Little Corn Island which we refer to this species differ strikingly in coloration from the only mainland example (San Pablo, Panama Republic) available for comparison. Above they are purplish mauve, paler on the unexposed portions of the limbs, the darker mauve being carried to the outermost fingers and toes while the three remaining fingers and four toes are colorless; on the back and other exposed surfaces are numerous, conspicuous creamy white spots and an irregular white streak on the sides. Below, uniformly white, except the tibia and to a lesser degree the femur, these are slightly suffused with mauve.

Structurally they do not differ from *callidryas*, being as follows: — Tongue elongate with small projections near the back, openly emarginate. Vomerine teeth in two oblique series, convergent posteriorly, anteriorly approaching the front inner border of the choanae. Head depressed, as long as broad; diameter of the eye equals its distance from the nostril which is nearer the end of the snout than it is to the eye; loreal region obtusely sloping, canthus rostralis straight, its edges

rounded; tympanum seven-eighths the diameter of the eye, roundish but the top portion of the circle incomplete. Fingers one-fourth, toes half-webbed, disks very large. The tibio-tarsal articulation of the adpressed hind limb reaches just beyond the eye; heels just meeting when pressed together while the limbs are at right angles. Skin smooth, its surface slightly shagreened.

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A COLLECTION OF BIRDS FROM CANA, DARIEN

By Ludlow Griscom

CAMBRIDGE, MASS., U. S. A.:
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No. 8.— *A Collection of Birds from Cana, Darien*

By Ludlow Griscom

It will not have been forgotten that in 1912 Major E. A. Goldman collected extensively in eastern Panama in various parts of the Rio Tuyra basin and, using Cana as a base, successfully ascended Mt. Pirri, and maintained a camp in the cloud forest for several weeks. Most unfortunately this collection has never been reported upon, but a remarkable number of new genera, species and subspecies were described by Dr. Nelson, unquestionably constituting the richest haul of novelties ever made by a single expedition anywhere in Central America in modern times. Three years later the American Museum collectors, Anthony, Richardson and Ball, made extensive collections in the Tuyra valley, and succeeded in reaching the subtropical zone on Mt. Tacarcuna, well to the north of Mt. Pirri. Here other novelties were secured, as well as some of the specialties of Mt. Pirri, but a rather surprising number of the latter were not found. The marked differences in the avifauna of the two mountains, and the absence from both collections of many subtropical genera common to South and Central America is evidence to my way of thinking that the surface has been scratched only and that this zone in eastern Panama will repay investigation for years to come. The situation has been exactly the same in the tropical zone, as two recent expeditions have brought back birds new to science and others new to Panama, in spite of the thousands of specimens brought back from the same general region by some of the most competent collectors in the world. Major Goldman's comment (Mammals of Panama, p. 14) that the fauna of the region, especially the birds, seemed inexhaustible, has been amply justified.

The collection of birds reported in this article was made in the spring and summer of 1928 by Mr. Rex R. Benson, who has been working in various parts of Panama, with conspicuous success, in the interests of the American Museum of Natural History. The reopening of the historic gold mines at Cana, which were abandoned shortly after Goldman's visit, made a trip to the Mt. Pirri district possible for the first time in years. Dr. Chapman's interest being primarily the cloud forest birds, he agreed to let this Museum buy the other collections and with unexampled generosity permitted us to describe and keep any novelties or rarities they might contain. Our best thanks are therefore due him, and to Dr. Barbour for purchasing it. I greatly appreciate the

constant advice and helpful assistance from both Messrs. Bangs and Peters of the Department of Birds while preparing this report.

The collection numbers 618 specimens, which refer to 193 species, thanks to Mr. Benson's selective ability. Only three localities are represented, and they are all well known. El Real and Cupe are in the Rio Tuyra valley, and Cana is in the foothills of Mt. Pirri above the valley, at an altitude of 2,000 ft. No specimen was taken at a higher altitude than 2,700 ft., and consequently a very small percentage of subtropical species is included, chiefly scattering individuals of birds, which descend to lower levels in the non-breeding season. Nevertheless fifteen forms are described as new, and over thirty are recorded from Panama for the first time, including several subtropical zone genera, previously unknown between western Panama and Colombia. I do not doubt that a third collection made at Cana sometime in the future will show exactly similar results. As a matter of record, all species secured are listed, including those whose occurrence in the region has no special significance.

Tinamus major saturatus, subsp. nov.

Type.— No. 140,451, M.C.Z.; breeding ♂; Cana, eastern Panama (alt. 2,200 ft.); April 18, 1928, Rex R. Benson.

Characters.— Most closely resembling *T. m. ruficeps* Sclater and Salvin of eastern Ecuador in the general darkness of coloration both above and below and the heavy barring above, but crown darker chestnut, finely barred with blackish, ear-coverts much paler ochraceous, occipital crest well developed, and browner rather than grayer below.

Remarks.— The puzzling variations of these large Tinamous have long been a bane to systematic workers, and it is doubtful if enough material exists as yet to enable us to discriminate accurately between variations which are truly geographic and those which are due to age, sex or even dimorphism. Dr. Chapman made the most notable contribution on this subject in his revision of the group in 1917 (Birds of Colombia, pp. 187–190), a treatment which has been followed by nearly everyone since.

The last ten years have seen a great increase of material, not only in specimens, but also in the completeness of their geographical distribution, and most of it, at one time or another, I have been able to examine in various eastern museums. As Salvin and Godman pointed out years ago, definite signs of immaturity are the ochraceous spots on the wings and the obscure buffy barring on the chest. It would seem also that

older birds tend to have less black barring above than younger, but this does not mean that the variation in this barring is not also a geographic character in series. Apparently independent of age, sex or season, there are two color phases, which are evident in all good series, some birds having a more olive cast above, while others will be more reddish brown. Apparently also, while the color of the crown is undoubtedly a subspecific character, it is impugned by the dusky obscurations on the tips of the feathers in younger birds. Thus the red-headed races will have sooty foreheads or crowns in one state of plumage, when they will closely resemble in this respect some specimens of races which never have rufous crowns.

Turning now to a review of the Central American forms, Dr. Chapman was unquestionably correct in regarding them as races of *Tinamus major*, but he did not have available at that time topotypical material of *any* of the three proposed species or forms, and he was further handicapped in that the principal character of *T. fuscipennis* of Costa Rica was entirely imaginary. This, according to Salvadori, was the blackish instead of brownish primaries of *T. robustus*, which, as Carriker suspected and Kennard and Peters have recently stated, is purely a matter of the relative freshness of the plumage. Comparison of over thirty specimens of *T. robustus* with an equal number of *T. fuscipennis* shows that the former is much grayer above and less reddish on the abdomen. The two races intergrade in Honduras and Nicaragua. Two specimens in the American Museum of Natural History from the high mountain forests of San Rafael del Norte in northern Nicaragua agree with Mexican and Guatemalan specimens and consequently represent the southern known limit of *T. m. robustus*. In the lowland rain forest, however, *T. m. fuscipennis* or birds which are nearer this form than *robustus* occur throughout eastern Nicaragua.

Southward in Central America the situation becomes more complicated. In southwest Costa Rica and Chiriqui (Pacific slope) a red-headed Tinamou appears, described as *T. castaneiceps* by Salvadori, and Dr. Chapman extended its range to include the whole of Panama and parts of Colombia, without, however, having seen topotypical material. Salvadori in the Catalogue of Birds, **27**, p. 501, however, recorded *T. fuscipennis* from "Veragua" (an Arcé specimen), supposedly in the range of *T. castaneiceps*, and Dr. Chapman comments upon an apparently typical specimen of *fuscipennis* in the American Museum of Natural History from Gatun in the Canal Zone. This apparently hopeless paradox induced Salvadori to describe them as distinct species, and made Dr. Chapman wonder if both races were ten-

able. The answer is that Tinamous recently collected on the Caribbean side of western Panama prove to be *T. m. fuscipennis* (c/o Kennard and Peters, Proc. Boston soc. nat. hist., **38**, no. 10, 1928, p. 446), which ranges south through the lowlands of Costa Rica and western Panama to the Canal Zone. At the same time *T. m. castanociceps* ranges south and east through the more open forests of the Pacific slope of western Panama to the Canal Zone, where the two races consequently meet, obviously accounting for the existence of both black and red-crowned Tinamous from the Canal Zone in collections. As we now know that many of Arcé's specimens, labeled merely "Veragua," came from the Caribbean slope of that province, the occurrence of *fuscipennis* as well as *castaneiceps* in his shipments is no longer surprising.

In eastern Panama we are still completely ignorant as to what form of *major* occurs on the Caribbean slope more than a few miles from the Zone. On the Pacific side, however, a fair amount of material exists, all of which I have examined. This material shows that *T. m. castaneiceps* crosses the Isthmus and, as we proceed eastward, becomes steadily darker, as the humidity of its environment increases, and develops a definite occipital crest. This character is pronounced in specimens from Tacarcuna (c/o Chapman, loc. cit., p. 189) and Cana, the type locality of the new race. Specimens collected by Barbour and Brooks at Jesusito are intermediate, one distinctly nearer *saturatus*, the other nearer *castaneiceps*. Undoubtedly the four birds from the "Tropical Zone of the Pacific Coast" of Colombia recorded by Dr. Chapman as *castaneiceps* belong here also. A summary of the Central American races, as I understand them, is appended.

1. *Tinamus major robustus*. Crown sooty black; no occipital crest; relatively grayer above, less reddish below, especially on the abdomen. Southern Mexico south to northern Nicaragua (in the highlands).

2. *Tinamus major fuscipennis*. Crown sooty black; no occipital crest; relatively browner above and more reddish below than the last. Caribbean lowlands of Honduras and Nicaragua and most of Costa Rica, south along the Caribbean slope of western Panama to the Canal Zone.

3. *Tinamus major castaneiceps*. Crown chestnut, finely barred with black; no occipital crest; general coloration same as the last. Southwestern Costa Rica and western Panama (Pacific slope) to the Canal Zone, intergrading farther east with the next.

4. *Tinamus major saturatus*. Crown darker chestnut, finely barred; a well-developed occipital crest; general coloration much darker above and darker and browner below; more heavily barred above. Extreme eastern Panama and northern Colombia.

ODONTOPHORUS GUIANENSIS CHAPMANI, subsp. nov.

Type.— No. 140,453 M.C.Z.; adult ♀.; Cana, eastern Panama; July 22, 1928; Rex R. Benson.

Characters.— Most closely resembling *O. g. panamensis* Chapman of the Canal Zone, and like that subspecies differing from all the other known races in having a whitish chin and whitish bars on the throat; differing markedly from *panamensis* in being darker and more richly colored throughout, with the lighter barring on the underparts tending to be broader, with an almost spotted appearance on the flanks; head noticeably darker, the longer crest feathers blackish brown; the gray foreneck and breast a much darker shade, appearing less contrasted with the brown back in consequence; in the more highly colored specimens the breast has a rich ruddy undertone.

Material examined

Odontophorus guianensis panamensis.— Canal Zone, 3 ♂, 1 ?; Jesusito, eastern Panama, 1 ♂; Mt. Sapo, 1 ♂, 2 ♀; El Real, 1 ♂.

Odontophorus guianensis chapmani.— Cana, eastern Panama, 1 ♂, 4 ♀.

Remarks.— This proposed new form is a dark extreme of *panamensis*, perhaps responding to the increasingly humid conditions as one proceeds eastward in Panama. Thus the specimens listed above, from Jesusito and Mt. Sapo, are intermediate between *panamensis* and the new form, but slightly nearer the former, while the bird from El Real well up the Tuyra valley in the interior is a still further approach to the new form. Specimens in the American Museum of Natural History from Tapalisa and Tacarcuna are in all probability similar intermediates.

Colombia is now the region from which material is badly needed. We do not as yet know exactly what *O. g. marmoratus* is and in what part of Colombia it occurs. According to Dr. Chapman's remarks (Bull. Amer. mus. nat. hist., **34**, 1915, p. 364) birds from the eastern side of the eastern Andes are different from those on the western side of the same range, which more nearly conform to Gould's original description. If these latter should prove to be *marmoratus* on comparison with the type, the former would be a connecting link with *buckleyi* of eastern Ecuador, which is a grayish extreme with no chestnut on the side of the head. Whatever *marmoratus* may prove to be, however, the new form differs from it in the deeper and brighter coloring of the side of the head, and in the whitish chin and barring on the throat.

Chaemepelia r. rufipennis (Bonaparte)

Cana, 1 ♂, 1 ♀, 1 juv.

Both sexes are a trifle darker than large series from adjacent parts of Panama and northern Colombia.

Claravis pretiosa livida Bangs

Cana, 1 ♂.

This perfectly tenable race of western Colombia, of which I have examined the type series and the material in the American Museum of Natural History, ranges north to eastern Panama at least to the upper part of the Tuyra valley. Todd's criticism of *livida* (Birds of Santa Marta, p. 192) is entirely beside the point. He writes that after going over his series "we are unable to separate the South American birds under the name *livida*," which, of course, cannot be done, and which neither Bangs nor Chapman ever suggested.

Leptotila cassini cassini Lawrence

El Tigre, Rio Cupe, 1 ♂; Cana, 3 ♂, 1 ♀.

A common forest dove throughout eastern Panama. Two of the males from Cana differ radically from any other specimens I have ever seen, in being distinctly darker both above and below and the vinaceous gloss of the interscapulium extends over the entire upper parts and wings.

Oreopeleia veraguensis (Lawrence)

El Tigre, Rio Cupe, 1 ♀.

While a very rare bird in Costa Rica and western Panama, this species is not uncommon in eastern Panama, and there is a good series in the American Museum of Natural History from the Tuyra valley.

Aramides cajanea cajanea (P. L. S. Müller)

Cana, 1 ♀.

As Bangs and Barbour have already shown, there is absolutely nothing in the race *salmoni* Chubb of northern Colombia and Panama.

Creciscus albigularis (Lawrence)

Cana, 3 ♂, 3 ♀.

This series is noticeably darker than a single adult from the Canal Zone, the type locality, but the latter is an old specimen and may have faded a little.

Himantopus mexicanus (P. L. S. Müller)

El Real, 1 ♀.

While there are relatively few published records for this bird in Panama, it is really a common winter visitant in suitable places throughout the republic.

Actitis macularia (Linnaeus)

Cana, 1 ♀.

The date of this specimen, July 25, 1928, is particularly noteworthy.

Butorides virescens virescens (Linnaeus)

El Real, 1 ♀ adult, January 18, 1928.

The Green Heron of eastern North America is a common winter visitant throughout Panama.

Butorides striatus striatus (Linnaeus)

El Real, 1 ♂ adult.

Our knowledge of this genus in Panama has progressed by leaps and bounds in the last few years, with the arrival in American museums of fresh breeding specimens from many different parts of this republic, as well as other parts of Central America. My colleague, Mr. J. L. Peters, will shortly review the whole *virescens* group, with which I am not here concerned. The variations of the well-known South American species *striatus* have received little study in this country, due to the absence or scarcity of adults from Surinam, the type locality. Wetmore has recently shown that birds from Argentina, Uruguay and Paraguay are distinct and must be known as *B. striatus cyanurus* (Vieillot). I heartily endorse this race, and regard it as more distinct than one would infer from Dr. Wetmore's remarks. Compared with nearly one hundred specimens from northern South America, a good series from Argentina is markedly paler throughout, the abdomen a light pearly gray

rather than slaty gray, the neck and throat more ochraceous less rufescent, in adults the darker streaking greatly reduced or absent. The material before me does not show that immature birds of *cyanura* have heavier streaking and spotting on throat and foreneck, but this may be an accident. Typical *striatus* ranges right across the continent, occurring even on Gorgona Island, off the west coast of Colombia, and ranges north to eastern Panama, and it is here recorded from Central America for the first time.

For some years I have known that a very peculiar Green Heron bred in the Canal Zone, which has been overlooked. Several specimens in the American Museum of Natural History, collected by Hallinan, were wrongly identified and recorded as *B. virescens* (c/o Auk, 1924, p. 308). More recently I have seen a few other specimens, and have seen the bird alive on Barro Colorado Island. It is instantly recognizable in life from both *virescens* and *striatus*, and may be known as

BUTORIDES STRIATUS PATENS, subsp. nov.

Type.— No. 114,030, M.C.Z., ♀ ad.; near Panama City, May 26, 1904; W. W. Brown.

Characters.— Readily distinguishable from typical *B. striatus*, in that the markings of the throat and foreneck are less rufous, more ochraceous brown; the cheeks, ear-coverts, and neck all round vary from "Benzo" brown to "hair" brown, instead of clear slaty gray; remaining underparts much darker gray, exactly resembling in this respect *B. virescens*.

This bird raises some interesting specific problems in the genus. It cannot be denied that if placed between a specimen of *virescens* and *striatus cyanurus*, it appears, roughly speaking, to be intermediate. On the other hand, if we examine the genus over the whole world, it is equally apparent that the North American *B. virescens* stands apart from the rest of the genus in having the sides of the head, neck and throat dark maroon. In this respect it is more different from *patens*, by far, than is the latter from typical *striatus*. Furthermore the legs and feet are greenish yellow in *virescens*, versus orange red in *striatus*, and the bare loral space is bright yellow versus indigo blue. On these accounts I cannot agree with Hartert in reducing *virescens* to a subspecies of *striatus*. We must also consider the geographic evidence available. Less than 100 miles up both coasts west of the Canal Zone *virescens* breeds abundantly, and this species must actually have crossed the Zone to reach the Pearl Islands, where it is a common resident. It

would seem that the low ground of the Isthmus was a neutral zone, which has been invaded by two species from two different directions. Indeed, when we consider the known tendency of this group to vary in relative darkness, a variation which has served as a basis for the description of numerous subspecies now known to be worthless, it is far more likely that the strongly marked characters of *patens* as a race of *striatus* will be impugned by individual variation rather than that it will be found to intergrade with *virescens* in a region where almost no area for such hypothetical intergrades to inhabit exists.

I do, however, agree with Hartert that the African *B. atricapillus* cannot be regarded as specifically distinct. In series it is barely separable from *striatus* in that the rufous streaks on the throat are a fraction paler and do not spread out over the breast quite so much. This is carried a stage farther in *B. javanica* and its allies, where the light central throat stripe is only faintly bordered with a tinge of buff on an otherwise gray background. There would seem to be no good reason to regard this difference as of specific value either. On the Andaman Islands the very dark and uniform *B. spodiogaster* appears specifically distinct from *javanica*. In the same respects *B. sundevalli* of the Galapagos Islands appears specifically distinct from either *virescens* or *striatus*, its New World allies, but these two dark forms resemble each other to an astonishing degree. The group clearly shows a mutational tendency towards melanism, which crops out as an individual variation in many forms, more rarely sufficiently constant to serve as a racial character, and in two island groups, at opposite sides of the world, this tendency to melanism has become dominant, and completely supplanted the paler ancestral type from the adjacent mainland. The case is very similar to that of the Honey Creepers on the Lesser Antilles, and deserves the attention of a competent geneticist. If I have in any way correctly stated some part of the biology of these birds, it will be apparent that to argue as to the number of "species" or "subspecies" to be recognized is comparatively futile. Neither binomials nor trinomials can possibly indicate these points of underlying biological interest, and no new "revision" of species and subspecies can be imagined which will not stress one line of evidence at the expense of another.

Ibycter americanus americanus (Boddaert)

Cana, 1 ♂.

Accipiter bicolor bicolor (Vieillot)

Cana, 1 ♂ imm.

Leucopternis ghiesbrechti costaricensis Sclater

Cana, 1 ♂.

This beautiful Hawk is not uncommon in the hills of eastern Panama, and this specimen, taken not far from the Colombian boundary, does not differ in any detail from Costa Rican topotypes.

Herpetotheres cachinnans fulvescens Chapman

Cana, 1 ♂.

The systematic treatment of the Central American races of the Laughing Falcon has become quite complicated with the increase of material in recent years. Dr. Chapman described a richly colored buffy race in 1915 (Bull. A. M. N. H., **34**, p. 638) from western Colombia and Ecuador, which he extended north to Panama and "perhaps to Nicaragua." As a matter of fact, we now know that whiter birds occur throughout this area, which are consequently quite indistinguishable from typical *cachinnans*. In eastern Panama the majority of specimens I have seen are buffy, but the one listed above is white, for instance. In western Panama neither type of coloration has a clear majority, and north of Panama the very great majority of specimens are white. I have, however, seen buffy colored specimens from the lowlands of eastern Nicaragua and Honduras, and such a variation is recorded from the lowlands of Vera Cruz. How should these facts be interpreted in nomenclature? The best course, it seems to me, is to regard the richer buffy coloration a tendency in the species, which crops out even in Surinam, and to restrict the name *fulvescens* to those areas where all or a clear majority of the specimens are richly colored. The race *fulvescens* thus ranges north to the Canal Zone, and intergrades with typical *cachinnans* by individual variation, instead of the more usual condition, where intermediate forms occupy an intermediate area. The only other course would be to reduce *fulvescens* to synonymy, which does violence to obvious facts in western Colombia and Ecuador.

Ictinia plumbea (Gmelin)

Cana, 1 breeding ♂.

Ciccaba virgata virgata (Cassin)

Cana, 1 ♀, dark phase.

The subspecific differences between far southern specimens of this common Owl and others from Central America have been overlooked by

everyone except Mr. Ridgway (Birds of N. and Mid. Amer., pt. 6, p. 765, footnote), who, however, took no definite action, because of lack of material. To this factor must be added the confusion caused by the two phases in this Owl, the dark phase of the northern bird being very close superficially to the light phase of the southern. Fortunately there is an additional character in the dark phase, as the streaking on the chest and breast is usually replaced by transverse mottling or barring. Brabourne and Chubb have recently designated "Colombia" as the type locality, so that it is the typical form, which really needs to be described. It differs from the Central American race, which I name below, in being radically darker, white completely disappearing from the underparts except the vent. The light phase averages darker than the dark phase of the "new," though better-known form, but is separable in having the underparts streaked from chin to abdomen. The dark phase is almost blackish brown above, deep buff beneath, the thighs cinnamon. Specimens from the Canal Zone are slightly intermediate, but, as is usual with Panama birds, nearer the eastern or South American form. *Syrnium lineatum* Lawrence from Lion Hill is consequently a synonym of *virgata*, so that the Central American form is named

Ciccaba virgata centralis, subsp. nov.

Type.— No. 238,212, M.C.Z., ♂ ad., light phase; Chivela, Oaxaca, Mexico; May 14, 1927; W. W. Brown.

Characters.— Similar to typical *Ciccaba virgata* (Cassin), but much paler throughout, the underparts never deeper than pale buff, the feathers of the abdomen and flanks always more or less white laterally, the terminal third usually pure white except for the dark shaft stripe.

Material examined

Ciccaba v. virgata.— Colombia; Santa Marta, 1 ♀, light phase; Panama; Cana, Darien, 1 ♀, dark phase; Canal Zone, 1 ♂, 1 ♀, both light phase.

Ciccaba virgata centralis.— Large series in every stage of plumage from Vera Cruz, Oaxaca, and British Honduras south to Chiriqui (Pacific slope). I have seen no specimens from Veraguas (Pacific slope) but they should belong here. Specimens from the Caribbean side of western Panama might be intermediate.

Brotogerys jugularis jugularis (Müller)

Cana, 2 ♂, 1 ♀ ?.

Pionus menstruus (Linnaeus)

Cana, 1 ♀, 1 imm.

Chloroceryle amazona (Latham)

Cana, 1 ♀.

Chloroceryle americana isthmica Goldman

El Tigre, Rio Cupe, 1 ♂.

Urospatha martii semirufa (Sclater)

Cana, 1 ♂.

Momotus subrufescens conexus Thayer and Bangs

El Real, 1 ♀.

Momotus subrufescens reconditus Nelson

El Tigre, Rio Cupe, 4 ♀.

Hylomanes momotula obscurus Nelson

Cana, 2 ♂, 5 ♀.

This subspecies, of which I have seen all the recorded specimens, is a distinct one, though the color characters given in the original description are by no means constant, if a sufficiently large series of the typical form is examined, so great is individual variation in this species. As with other Motmots, there is a browner and a greener phase, and browner birds of the typical form closely approximate the alleged characters of *obscurus*. In series, however, the latter bird does average darker below, especially on the sides and flanks, the suborbital streak is less developed, the chin is buffier and more streaked with blackish, and the forehead is much less often tinged with the buffy of the lores. These characters are most pronounced in Colombian specimens, and least developed in the type from the Canal Zone. In the great majority of cases, however, Canal Zone intermediates are nearer the eastern Panama form and, with this geographic probability in mind, I greatly prefer to call all birds from the Canal Zone eastwards *obscurus*. The other course would be to regard *obscurus* as a synonym of *momotula*, and describe the Colombian bird, a nomenclatural shuffle which would serve no useful purpose.

Nyctidromus albicollis albicollis (Gmelin)

Cana, 1 ♂, 1 ♀.

I agree entirely with Todd (Birds of Santa Marta, p. 219) that the Central American bird from Guatemala to the Canal Zone is distinct from typical *albicollis*, but there is no point in describing it until thorough restudy of the Mexican races, some of which appear very unsatisfactory.

Streptoprocne zonaris albicincta (Cabanis)

Cana, 1 ♂, 1 ♀.

While I do not recall seeing specimens from Darien before, the occurrence of this Swift in the region was a certainty.

Threnetes ruckeri darienensis Bangs and Barbour

El Tigre, Rio Cupe, 1 ♂.

Glaucis hirsuta affinis Lawrence

Cana, 1 ♂.

Phœthornis guy coruscus Bangs

Cana, 1 ♀.

This specimen has as blue a rump as any in the large series of topotypes from Costa Rica. A series from the Pacific side of the western Andes of Colombia undoubtedly belong here also, and not to *emiliae*.

Polyerata amabilis (Gould)

Cana, 3 ♂, 1 ♀.

Damophila panamensis Berlepsch

El Real, 1 ♀; El Tigre, Rio Cupe, 1 ♂.

Thalurania fannyi fannyi (Delattre and Bourcier)

Cana, 3 ♂, 1 ♀.

Chalybura buffoni micans Bangs and Barbour

Cana, 1 ♀.

Colibri delphinae (Lesson)

Cana, 2 ♂.

Oddly enough this widely ranging species has only been recorded in Panama from the Caribbean side of the Pico Calovevora in Veraguas.

Heliodoxa jacula jacula Gould

Cana, 1 ♂ imm., 1 ♀.

These birds in their small size and bronze-tinged central tail feathers are clearly referable to the typical form of "Bogota." The genus has never been recorded between western Panama and Colombia, though its occurrence in the mountains of eastern Panama was to be expected.

Klais guimeti (Bourcier and Mulsant)

Cana, 1 ♂.

Trogon collaris extimus, subsp. nov.

Type.— No. 140,533, M.C.Z., ♀ breeding; Cana, Darien; March 22 1928; Rex R. Benson

Characters.— Similar to *Trogon collaris virginalis* (Cab. and Heine) of western Ecuador and Colombia, but slightly smaller; adult male differing in having the freckling on the wing-coverts finer and darker, with more black and less white; female with the brown areas darker, most noticeable on the rump, but easily separable by the difference in the three outer pairs of tail feathers, which have a much greater area of solid black on the inner webs.

Remarks.— The discovery of a new race of this species in eastern Panama, while adding one more South American species to that apparently inexhaustible bird fauna, is of special geographic interest in closing the gap between the Central American *T. puella* and the South American *T. collaris*. The adult male is very close to *T. c. virginalis*, but in the darker vermiculation of the wing-coverts exactly resembles *puella*. It differs from the latter, however, in having the broader white bars and tips to the tail feathers of *collaris*. While *virginalis* and *extimus* have narrower bars than true *collaris*, they are not strictly intermediate in this respect, but are obviously nearer *collaris* than *puella*. With females the case is very different, the newly described form being a perfect connecting link with *puella*. Systematists can consequently take their choice in treating *puella* as specifically distinct or as a subspecies of *collaris*.

Material examined

Trogon c. collaris.— 6 ♂, 8 ♀ from Trinidad, Tobago, northwest Venezuela and east Ecuador.

Trogon collaris virginalis.— 9 ♂, 8 ♀ from western Peru and Colombia.

Trogon collaris extimus.— 1 ♂, 2 ♀, Cana, eastern Panama.

Trogon collaris puella.— Large series from the entire range.

Measurements of Wing

	Male	Female
T. collaris virginalis	119–125	119–126
T. collaris extimus	115.2	113.2–114

TROGON STRIGILATUS CHIONURUS Sclater and Salvin

El Tigre, Rio Cupe, 1 ♂; Cana, 2 ♂.

CURUCUJUS MELANURUS MACRURUS (Gould)

Cana, 1 ♂; El Real, 1 ♀.

PIAYA CAYANA THERMOPHILA Sclater

El Tigre, Rio Cupe, 1 ♀; Cana, 1 ♂, 2 ♀.

COCCYCUA RUTILA PANAMENSIS Todd

Cana, 1 ♀.

NEOMORPHUS SALVINI SALVINI Sclater

Cana, 1 ♂.

CROTOPHAGA ANI Linnaeus

Cana, 1 ♂, 2 ♀.

EUBUCCO BOURCIERI ANOMALUS, subsp. nov.

Type.— No. 140,512, M.C.Z., ♂, approaching the breeding season; Cana, eastern Panama; August 1, 1928; Rex R. Benson.

Characters.— Differing from all the described races of the species in being smaller, and streaking on abdomen narrower, more sharply defined and darker; in other color characters nearer to typical *bourcieri* than to either of the geographical allies, *salvini* and *occidentalis*.

Material examined

Eubucco b. bourcieri.— "Bogota," Colombia, 5 ♂, 2 ♀.

Eubucco b. occidentalis.— Colombia, various localities on the west slopes of the western Andes, 8 ♂, 5 ♀.

Eubucco b. anomalus.— Eastern Panama, Cana, 3 ♂, 1 ♀.

Eubucco b. salvini.— Very large series from Costa Rica and western Panama.

Remarks.— Another discovery of geographic interest, as this genus has hitherto been unknown between western Panama and Colombia. It is rather surprising to find how closely *salvini* of Central America and *occidentalis* of western Colombia resemble each other, the color characters separating them being obviously only in series. Between them geographically comes *anomalus* of eastern Panama, a very different bird, more closely allied in certain respects to typical *bourcieri*. Below I give a summary of the characters of the new form and its allies. The streaking on the abdomen holds for both sexes.

Eubucco b. bourcieri.— Male:— red of throat greatly extended over breast, with a very narrow zone of yellow between it and the abdomen; abdomen more broadly streaked; wing 70–75. Female: — chin paler, less yellow; black on forehead narrower, with a broad blue posterior margin; orange of head more extended, reaching nape.

Eubucco b. anomalus.— Male: — red of throat not invading breast, the yellow and orange area narrower; abdomen more heavily, darkly and narrowly streaked; wing 66.5–69.5. Female: — chin much yellower; no blue posterior margin to forehead; orange of head less extended, not reaching to nape.

Eubucco b. salvini.— Male: — red of throat succeeded by broad areas of orange and yellow; streaking of abdomen duller and more diffuse than in *bourcieri;* wing 68–72.5. Female: — chin intermediate between *bourcieri* and *anomalus;* black area on forehead broader with a very narrow posterior margin of blue; orange of head as in *anomalus.*

Eubucco b. occidentalis.— Closely resembling *salvini* but more richly colored, the ground color of abdomen slightly yellower, in males the orange and yellow areas more extensive and a trifle deeper; wing 70–73.

Rhamphastos piscivorus brevicarinatus Gould

Cana, 1 ♂, 1 ♀.

Rhamphastos swainsoni Gould

Cana, 1 ♂.

PTEROGLOSSUS TORQUATUS TORQUATUS (Gmelin)

Cana, 1 ♂.

JACAMEROPS AUREA PENARDI Bangs and Barbour

El Tigre, Rio Cupe, 1 ♀.

NOTHARCUS HYPERRHYNCHUS LEUCOCRISSUS (Sclater)

El Real, 1 ♀.

For the occurrence of this race in eastern Panama, see Chapman, Birds of Colombia, p. 340.

NOTHARCUS TECTUS SUBTECTUS (Sclater)

El Tigre, Rio Cupe, 1 ♀.

NYSTALUS RADIATUS (Sclater)

Cana, 3 ♂, 4 ♀.

MALACOPTILA PANAMENSIS PANAMENSIS Lafresnaye

Cana, 3 ♀.

NONNULA FRONTALIS FRONTALIS (Sclater)

El Real, 1 ♂, 1 ♀; El Tigre, 1 ♂; Cana, 3 ♂, 2 ♀.

The status of Panama specimens of this little Nun-bird has been uncertain for some years, due to the lack in the United States of typical Colombian specimens. These have recently been acquired by the Carnegie Museum and thanks to the courtesy of Mr. W. E. Clyde Todd I have been able to examine six specimens from Antioquia and Santander, and also a series of the very distinct *pallescens* Todd from Santa Marta. With nineteen specimens in all from eastern Panama before me, individual variation is excellently represented, and there is no doubt but what they are inseparable from typical *frontalis* and show no approach whatever to *pallescens*.

CHRYSOPTILUS PUNCTIGULA LUCESCENS, subsp. nov.

Type.— No. 140,590, M.C.Z.; ♂ adult; El Real, eastern Panama; January 18, 1928; Rex R. Benson.

Characters.— Nearest *Chrysoptilus p. striatigularis* Chapman, but differing from it and every other described form in having the white

throat much more narrowly streaked with black, and the general coloration much brighter and clearer, the rump a cleaner sulphur yellow, the underparts also a deeper and purer yellow, the breast with far more of an orange tawny wash, invaded by the red of the malar stripe; spotting of underparts greatly reduced, even less than in *ujhelyii*, entirely wanting except on breast and center of abdomen, where the individual spots are half the size of those in *striatigularis*.

Crosby and I added this Woodpecker to the Panama avifauna in February 1927 (Amer. Mus. Novitates, no. 282, p. 6). The single specimen collected at Cape Garachiné differed obviously from its closest relative, *striatigularis*, but in so variable a group I preferred to see these differences confirmed. The present specimen has these characters developed to an even greater degree, and I have no hesitation left in describing it.

Centurus pucherani pucherani (Malherbe)

Cana, 1 ♂.

Veniliornis kirkii ceciliae (Malherbe)

Cana, 3 ♂.

With more material from eastern Panama available, I entirely agree with Dr. Chapman that *V. k. darienensis* Ridgway is untenable (c/o Distribution of Bird-Life in Ecuador, p. 366).

Phloeoceastes malherbii (Gray)

El Tigre, Rio Cupe, 1 ♀.

Ceophloeus lineatus mesorhynchus (Cabanis and Heine)

Cana, 1 ♂.

Picumnus olivaceus olivaceus Lafresnaye

Cana, 3 ♂, 3 ♀.

Until better series are available, the Piculet of extreme eastern Panama must be referred to typical *olivaceus* of Colombia. West of the more humid forested areas of eastern Panama, in the scrub country from the Canal Zone westward to western Costa Rica, only one form *flavotinctus* occurs. I have seen nearly one hundred specimens from every part of this area, and an excellent series from the Canal Zone now before me shows that it is quite impossible to maintain the proposed local race *panamensis* Ridgway.

Cymbilaimus lineatus fasciatus (Ridgway)

Cana, 4 ♂, 3 ♀.

Taraba major transandeana (Sclater)

Cana, 1 ♂, 1 ♀.

Thamnophilus nigriceps Sclater

El Tigre, Rio Cupe, 1 ♂; El Real, 1 ♀.

While this antshrike has only once been recorded from eastern Panama, it is really one of the common birds in the more arid tropical forest near the coast and up the larger rivers, which is characterized by the giant *Cavanillesia* or "cuipo" tree.

Thamnophilus punctatus atrinucha Salvin and Godman

El Tigre, Rio Cupe, 1 ♂; Cana, 5 ♂, 3 ♀.

The four females from Cana are appreciably darker brown than any other Central American specimens. These differences must be highly local, even if constant, as Colombian and Ecuadorean specimens are lighter again.

Thamnistes anabatinus coronatus Nelson

Cana, 2 ♂, 4 ♀.

Myrmotherula brachyura ignota, subsp. nov.

El Tigre, Rio Cupe, 1 ♀.

Type.— No. 87,224, M.C.Z.; ♂ ad.; Jesusito, eastern Panama; April 7, 1922; Barbour and Brooks.

Characters.— Similar to typical *M. brachyura* of Cayenne and Amazonia, but the light streaking on pileum, wings and back greatly reduced, resulting in more solidly blackish areas; female with much paler rufous crown stripes, and no fulvous on throat.

Remarks.— This distinct race has been overlooked for the reason that this tiny Ant-wren has only twice been recorded from Panama. The two recently collected specimens before me, when compared with an equally fresh series from eastern Ecuador, show very clearly the characters given above. The measurements below may indicate that the new form is also smaller.

Measurements of Wing

M. b. brachyura, 3 ♂, 38.5–44 (41.1); 4 ♀, 40.5–43.5 (42.5)
M. b. ignota, 2 ♂, 38.5–39.5 (39); 1 ♀, 38.5

Myrmotherula surinamensis pacifica Hellmayr

Cana, 6 ♂, 7 ♀.

Myrmotherula fulviventris Lawrence

El Tigre, Rio Cupe, 1 ♀.

Myrmotherula axillaris albigula Lawrence

El Tigre, Rio Cupe, 3 ♂, 1 ♀; Cana, 1 ♂.

Myrmotherula schisticolor schisticolor (Lawrence)

Cana, 1 ♂.

Microrhopias quixensis consobrina (Sclater)

Cana, 1 ♂, 3 ♀.

Cercomacra tyrannina rufiventris (Lawrence)

El Tigre, Rio Cupe, 1 ♂, 2 ♀; Cana, 4 ♂, 4 ♀.

Cercomacra nigricans Sclater

Cana, 3 ♂.

Gymnocichla nudiceps nudiceps (Cassin)

Cana, 1 ♀.

Myrmeciza maculifer cassini (Ridgway)

El Tigre, Rio Cupe, 1 ♂, 2 ♀; Cana, 2 ♂, 1 ♀.

I have elsewhere (Amer. Mus. Novitates, no. 282, 1927, p. 6) given my reasons for regarding this bird as specifically distinct from *M. exsul*.

Myrmeciza immaculata berlepschi Ridgway

Cana, 3 ♂, 1 ♀.

Formicarius analis panamensis Ridgway

Cana, 1 ♂, 3 ♀.

GYMNOPITHYS BICOLOR BICOLOR (Lawrence)

El Tigre, Rio Cupe, 1 ♂, 1 ♀; Cana, 2 ♂, 1 ♀.

HYLOPHYLAX NAEVIOIDES NAEVIOIDES (Lafresnaye)

El Tigre, Rio Cupe, 1 ♂, 1 ♀.

MYRMORNIS STICTOPTERA (Salvin)

El Tigre, Rio Cupe, 1 ♂.

GRALLARIA GUATIMALENSIS CHOCOENSIS Chapman

Cana, 1 ♂.

This individual agrees minutely with the small measurements given for this form, to date known only from one specimen, and also the lores are mixed with blackish. In other respects it agrees minutely in color with richly tinted specimens of *princeps*. This is another subtropical zone genus here recorded for the first time in eastern Panama.

GRALLARIA FULVIVENTRIS BARBACOAE Chapman

Cana, 1 ♂.

There has been a great gap between the range of the South American forms of this species and the outlying representative *divcs* in Costa Rica, which has now been partially filled. The specimen listed above differs from two topotypes of *barbacoae* only in being a little paler and more olive above, a character which may or may not prove constant, when a series becomes available in the future. There is another specimen in the American Museum of Natural History (No. 135,797), taken at Tacarcuna in 1915, already recorded by Hellmayr (Cat. Birds of the Americas, pt. 3, p. 351). Benson collected a new form *G. f. flammulatus* Griscom at Almirante in 1927, so that this species is now known from both eastern and western Panama.

SYNALLAXIS BRACHYURA CHAPMANI Bangs and Penard

Cana, 7 ♂, 1 ♀.

There has been considerable difference of opinion recently as to the proper treatment of eastern Panama, west Colombia and west Ecuador specimens of this species. Dr. Chapman in his Colombian report pointed out the respects in which west Colombian birds differed

from the Nicaraguan *nigrifumosa*. These differences were named formally by Bangs and Penard, who had additional material from western Colombia. Some years later Dr. Chapman found that birds from west Ecuador, a drier climate, were even paler than Colombian birds and, while refusing to recognize the validity of *chapmani*, described *griseonucha*. Dr. Hellmayr was unable to accept this disposition of the case (Cat. Birds of the Americas, pt. 3, p. 92) and regarded *chapmani* as a poor race, but referred all specimens from the Canal Zone southward to it. With the advantage of having seen all the material in both institutions, there is no doubt that the extremes from Nicaragua and southwest Ecuador are quite different. We have here, then, the all too familiar case of two excellent extremes, where the intermediate form occupies a larger area than either, and was named prior to one of the extremes. In such cases either three very slight forms are maintained, or the intermediate one is stretched to include one of the extremes. This is Dr. Hellmayr's solution and it is probably the better.

Automolus pallidigularis pallidigularis Lawrence

El Tigre, Rio Cupe, 1 ♂; Cana, 2 ♂, 3 ♀.

Automolus nigricauda saturatus Chapman

Cana, 1 ♀.

Philydor fuscipennis erythronotus Sclater and Salvin

Cana, 3 ♂.

Dr. Chapman has already shown that *Philydor erythronotus* occurs in eastern Panama and that *P. fuscipennis* represents it in western Panama (Distribution of Bird-Life in Ecuador, p. 447). Like *Xenicopsoides*, young birds are much more fulvous and ruddy underneath. The bird recorded by Bangs and Barbour (Bull. M.C.Z., **65**, 1922, p. 211) as *fuscipennis* is really this form. In western Panama *fuscipennis* is an exceedingly rare bird. There is an old faded Arcé skin in the American Museum of Natural History, purporting to come from Chitra in Veraguas, and in 1926 Benson and Gaffney secured four specimens for me on the Rio Calovevora in the Caribbean rain forest. The type locality, "Santiago de Veraguas," was Arcé's residence, but none of his forest species ever came from there. From *erythronotus*, *fuscipennis* differs chiefly in being more olive-brown, less rufous on the back.

Xenoctistes subalaris tacarcunae (Chapman)

Cana, 1 ♂, 2 ♀.

A well-marked form previously recorded only from the type locality.

Xenops minutus littoralis Sclater

El Tigre, Rio Cupe, 1 ♀; Cana, 4 ♂.

As is so often the case, the low-lying land of the Canal Zone is the dividing line between two recognizable forms of this little Ovenbird. East of the Zone all specimens seen are distinctly more olivaceous below, with a more dusky pileum. They are inseparable from *littoralis* of west Ecuador and west Colombia. West of the Zone very large series available are browner below with a less dusky pileum, and agree with specimens from Costa Rica and eastern Nicaragua. For these the name *ridgwayi* Hartert and Goodson is available and this has been correctly applied by Dr. Hellmayr (Cat. Birds of the Americas, pt. 4, p. 237), except that he gives *ridgwayi* as ranging throughout Panama, which it does not. Specimens from Mt. Sapo and Jesusito, eastern Panama, recorded by Bangs and Barbour as *ridgwayi*, are in reality *littoralis*. It was probably a similar assumption, that *ridgwayi* was the "Panama" form, which caused Dr. Chapman recently to impugn its validity (c/o Distribution of Bird-Life in Ecuador, p. 450).

Xenops rutilus heterurus Cabanis and Heine

Cana, 1 ♂, 1 ♀.

This species of *Xenops* is an exceedingly rare bird in Central America, less than ten specimens being in existence from Costa Rica and the Volcan de Chiriqui. It is of some interest, therefore, to record it from eastern Panama. The subspecific identity of the two specimens listed above must remain doubtful until series from both eastern and western Panama are available. The Cana birds are more olivaceous, less brownish below, than Colombian specimens, and are very much smaller, the wing 60 and 61 mm., compared with a range of 66.5–70.5. They would appear to be an unnamed form, but to do so would serve no useful purpose, as it would leave the status of west Panama birds in doubt. Two specimens from Chiriqui are also olivaceous below, but have heavier bills as in typical *heterurus*, and are exactly intermediate in size, the wing 61.5 and 67 respectively. When adequate series are compared

with *heterurus*, however, I think it probable that two distinct forms can be discriminated.[1]

Sclerurus guatemalensis guatemalensis (Hartlaub)

Cana, 1 ♂.

Glyphorhynchus spirurus pectoralis Sclater and Salvin

Cana, 1 ♂, 1 ♀.

Dendrocincla meruloides ridgwayi Oberholser

El Real, 1 ♂; El Tigre, Rio Cupe, 2 ♀; Cana, 1 ♂, 1 ♀.

Dechonychura typica darienensis, subsp. nov.

Type.— No. 140,413, M.C.Z.; ♀ adult; Cana, eastern Panama; August 6, 1928; Rex R. Benson.

Characters.— Similar to *D. t. typica* Cherrie of southwestern Costa Rica, but smaller and much darker; upper parts darker and more olive brown, less umber; underparts similarly darker and more olive; buffy of chin, throat and breast spots deeper, the border to the breast spots almost blackish; bend of wing only faintly washed with dark cinnamon; wing, 85.5; tail, 80.5; culmen, 18.

Remarks.— Our knowledge of this little known genus has grown by leaps and bounds in the last ten years, and the new form here described fills in one of the gaps in the range of the genus. In Amer. Mus. Novitates, no. 293, January 12, 1928, p. 1, I provisionally recorded two specimens collected by Benson at Almirante as *D. typica minor* Todd. These birds may, however, represent still another subspecies. The dark coloration of the new form is very striking at a glance, and its color characters are, consequently, diametrically opposite to those of the paler *minor*.

Xiphorhynchus guttatus nanus (Lawrence)

Cana, 2 ♂, 2 ♀.

Xiphorhynchus lachrymosus lachrymosus (Lawrence)

El Tigre, Rio Cupe, 1 ♂, 2 ♀.

Lepidocolaptes souleyetii lineaticeps (Lafresnaye)

Cana, 2 ♂, 2 ♀.

[1] Since this was written, the Costa Rican bird has been described as *Septentrionalis* Zimmer, Proc. Biol. Soc. Wash., **42**, 1929, pp. 82-83.

DENDROCOLAPTES CERTHIA SANCTI-THOMAE (Lafresnaye)

El Real, 1 ♀.

PLATYRINCHUS CORONATUS SUPERCILIARIS Lawrence.

El Tigre, Rio Cupe, 1 ♂.

RHYNCHOCYCLUS OLIVACEUS BARDUS (Bangs and Barbour)

Cana, 3 ♂, 4 ♀.

TOLMOMYIAS FLAVOTECTUS (Hartert)

El Tigre, Rio Cupe, 1 ♂.

TODIROSTRUM CINEREUM CINEREUM (Linnaeus)

Cana, 2 ♂.

These two specimens are intermediate between typical *cinereum* and *finitimum* Bangs of Central America north of the Canal Zone, but are distinctly nearer the former in the grayer, less green back, and the less sharply contrasted less blackish crown. The species does not seem to have been recorded previously from eastern Panama, though its occurrence was, of course, to have been expected.

ONCOSTOMA OLIVACEUM (Lawrence)

El Real, 1 ♂, 1 ♀; El Tigre, Rio Cupe, 1 ♂; Cana, 1 ♂.

This curious little Flycatcher is common and widely distributed in all the more heavily forested regions of eastern Panama. I cannot agree with Dr. Hellmayr in treating it as a subspecies of *O. cinereigulare*, admittedly, however, a matter of opinion rather than of fact.

LOPHOTRICCUS PILEATUS SQUAMAECRISTA (Lafresnaye)

Cana, 1 ♂, 1 ♀.

Another genus previously unknown between western Panama and Colombia. As might be expected the east Panama bird belongs to the South American rather than the Central American form.

MIONECTES OLIVACEUS HEDERACEUS Bangs

Cana, 1 ♀.

PIPROMORPHA OLEAGINEA PARCA Bangs

El Real, 1 ♂; El Tigre, Rio Cupe, 1 ♂, 1 ♀; Cana, 2 ♂, 1 ♀.

LEPTOPOGON SUPERCILIARIS TROGLODYTES, subsp. nov.

Cana, 6 ♂, 2 ♀.

Type.— No. 140,511, M.C.Z.; ♀ adult; Cana, eastern Panama; June 27, 1928; Rex R. Benson.

Characters.— Similar in coloration to typical *Leptopogon superciliaris* of central Peru and eastern Ecuador, but much smaller; smaller also than the geographically adjacent *poliocephalus* of Colombia, but underparts brighter yellow, breast a purer green, and wing-bars and edgings buffier.

Remarks.— Two reviews of this Flycatcher have recently been published (c/o Chapman, Distribution of Bird-Life in Ecuador, pp. 499–500; also Hellmayr, Cat. Birds of the Americas, pt. 5, pp. 484–487). Both leave the status of the Central American bird uncertain, and they disagree radically in their treatment of the South American birds north of Peru. Dr. Chapman had the advantage of having far larger series available for comparison. I am familiar with this material, and agree thoroughly with him that *poliocephalus* Cabanis and Heine is entirely worthy of recognition as an average race, and the material in the Museum of Comparative Zoölogy supports this view. There seems no question but that west and central Colombian birds in series are paler yellow below, a trifle more gray green on the chest, and have yellower, less buffy wing-bars, in spite of the admitted individual variation which exists in all three respects. If the validity of *poliocephalus* be admitted, it deprives *venezuelensis* of any color character, as those claimed by Hellmayr are exactly the same as those of *poliocephalus*. The recognition of this race, therefore, will have to rest solely on slight size differences, the wing of males 64–68 mm. according to Hellmayr, as against 68–72 in Colombian and Peruvian specimens. The claims of west Ecuador birds to recognition as *transandinus* Berlepsch and Taczanowski are even more dubious, as the color characters noted by Hellmayr in nine specimens are not appreciable in nine other specimens in New York. Proceeding northward to eastern Panama, we return to the brighter coloration of typical *superciliaris* correlated with a marked decrease in size, the wing of 6 males 61.5–65, of 2 females 58–58.5. With characters of both color and size, these birds seem fully entitled to formal recognition.

The Costa Rican representative of this species has never received proper recognition, due to its rarity. Both Hellmayr and Chapman had seen but one or two specimens. The Museum of Comparative Zoölogy alone possesses an adequate series (12), but when Bangs was studying

his Costa Rica collections there was practically nothing available from South America. With his usual acumen Dr. Hellmayr (loc. cit., p. 485) points out that the single specimen from Costa Rica examined by him had a slightly brighter green back and a less slaty, more olivaceous head. These points prove to be constant in series, so I propose

Leptopogon superciliaris hellmayri, subsp. nov.

Type.— No. 116,207, M.C.Z.; ♂ adult; Carrillo, Costa Rica; November 23, 1898; C. F. Underwood

Characters.— Resembling *L. s. supereiliaris* and *L. s. troglodytes* in general coloration, but back a very slightly brighter green; head less slaty, more olivaceous, less sharply defined from the green back, the feathers of rear half of the crown and nape olive basally and often edged laterally with olive; size small as in *L. s. troglodytes*, wing in 8 males 63.5–67, in 4 females 57.5–61.

Tyranniscus vilissimus parvus Bangs

Cana, 1 ♂.

Elaenia flavogastra subpagana Sclater and Salvin

Cana, 1 ♀.

This specimen is intermediate between *subpagana* and typical *flavogastra*, but is distinctly nearer the Central American form.

Elaenia gaimardii macilvaini Lawrence

Cana, 2 ♀.

Legatus leucophaius leucophaius (Vieillot)

Cana, 1 ♂.

Myiozetetes cayanensis harterti Bangs and Penard

Cana, 2 ♂, 3 ♀.

This is a perfectly tenable subspecies in series, but the Cana specimens from extreme eastern Darien show a distinct approach to the Colombian *hellmayri*.

Myiozetetes granadensis granadensis Lawrence

Cana, 1 ♀.

Myiodynastes maculatus maculatus (Müller)

Cana, 3 ♂, 4 ♀.

I agree with Todd and Carriker in regarding the characters of the northern race *nobilis* Sclater as too slight and variable for recognition.

Onychorhynchus mexicanus fraterculus Bangs

Cana, 2 ♂, 1 ♀.

Cnipodectes subbrunneus subbrunneus (Sclater)

El Real, 1 ♂; El Tigre, Rio Cupe, 1 ♂, 1 ♀; Cana, 3 ♂, 9 ♀.

Myiobius sulphureipygus aureatus Bangs

Cana, 1 ♂.

Myiobius atricaudus atricaudus Lawrence

Cana, 2 ♂.

Terenotriccus erythrurus fulvigularis (Salvin and Godman)

El Tigre, Rio Cupe, 1 ♀.

Aphanotriccus audax (Nelson)

Cana, 1 ♂.

Apparently this is the third recorded specimen of a very distinct species, which was described as a new genus *Praedo*. The original diagnosis states that it is closely allied to *Aphanotriccus*, but with a strong resemblance in coloration to *Empidonax*. Then follows a long list of structural respects in which it differs from *Empidonax*, to which it might be added that the basal phalanx of the outer toe is entirely coherent to the middle toe, as in *Myiobius*, *Myiotriccus*, and *Aphanotriccus*, whereas it is entirely free in *Myiophobus* and *Empidonax*. No structural characters, however, are given by which *Praedo* can be separated from *Aphanotriccus*, nor are there any that could seriously be urged as of generic value, especially when we consider how slight are the claims of *Aphanotriccus* to separation from *Myiobius*. In shape and proportions of bill, development of the rictal bristles, wing and tail proportions, and primary formula, *Praedo audax* Nelson is exactly the same as *Aphanotriccus capitalis*. At first sight the coloration of *audax*

strongly suggests *Empidonax*, but careful comparison shows that, while a very distinct species, it is obviously a representative of *Aphanotriccus capitalis*. Both are small Flycatchers with the head grayer and darker than the back, with two colored wing-bars, a whitish chin and throat, a darker, broad breast band and yellow abdomens. In *capitalis* a brown or tawny wash produces a bird with an olive back, tawny wing-bars and an ochraceous-cinnamon breast band. In *audax* a green wash produces a bird with an olive-green back, greenish yellow wing-bars, and an olive green breast band. They are closely allied, even in the color of the bill. *Aphanotriccus* differs from *Myiobius* in having a mandible almost as dark as the maxilla. This is true both of *audax* and *capitalis*, and they differ only in that the bill of the former is blacker throughout rather than browner. I am convinced, therefore, that in *Praedo audax* we have merely a specifically distinct representative of *Aphanotriccus capitalis*, even so, one of the most interesting discoveries made by Goldman in eastern Panama. Both are rare and local inhabitants of the densest sort of tropical rain forest, and replace each other in widely disconnected areas.

Even with the suppression of the genus *Praedo*, generic lines in this group of Flycatchers are technically difficult and unsatisfactory. *Myiobius* (*sensu stricto*) and *Empidonax* are clearly distinct both in coloration and structure. But the difference in coloration is pretty well bridged if we pass from *Myiobius* to *Myiotriccus* and the two species of *Aphanotriccus*. In structure *Myiophobus* is a *Myiobius* with the free outer toe of *Empidonax*. *Mitrephanes* seems even more different from *Myiobius* than *Empidonax*, but *Empidonax atriceps* approaches *Mitrephanes* in certain respects, and the aberrant Peruvian species *ochraceiventris* Cabanis is bandied about from *Mitrephanes* to *Myiophobus*, where it is less out of place, but obviously not in place. Finally the recently described *Xenotriccus* Dwight and Griscom combines certain characters of *Aphanotriccus* and *Mitrephanes*, with others suggesting a different subfamily. It has been my good fortune to examine every described genus of the family and practically all the aberrant species, and I am more than ever impressed by the utter hopelessness of producing a classification, which will compare with that of some older group, where natural selection and evolution have had an additional million years or so to exterminuate a vast horde of variously intermediate types. Finally, to be perfectly honest, we do not really know what a Tyrant Flycatcher is.

Mitrephanes berlepschi eminulus Nelson

Cana, 1 ♂, 2 ♀.

It is entirely a matter of opinion as to whether *phaeocercus, aurantiiventris, berlepschi* and *olivaceus* should be regarded as specifically distinct or as subspecies of *phaeocercus.* I prefer the former course, as in Central America, at least, the sharp breaks in the continuity of the Subtropical Zone are accompanied by equally sharp breaks in the color characters. There is no doubt but what *aurantiiventris* of Costa Rica and western Panama is half way between *phaeocercus* and *berlepschi,* but I have yet to see a specimen which could not instantly be placed in one of the three groups without comparison.

Empidonax flaviventris (Baird)

Cana, 1 ♂, April 14.

Previously unrecorded beyond the Canal Zone.

Myiarchus tuberculifer brunneiceps Lawrence

El Tigre, Rio Cupe, 1 ♂; Cana 1 ♂, 1 ♀.

Tyrannus melancholicus chloronotus Berlepsch

Cana, 3 ♂, 5 ♀.

Tyrannus tyrannus (Linnaeus)

Cana, 1 ♂, 1 ♀, April 26.

Oxyrunchus brooksi Bangs and Barbour

Cana, 1 ♂.

Chloropipo holochlora litae Hellmayr

Cana, 1 ♂.

The only reference to the occurrence of this genus in Panama is that of Dr. Chapman (Distribution of Bird-Life in Ecuador, p. 533), where eastern Panama is included in the range of this form.

Pipra erythrocephala actinosa Bangs and Barbour

El Tigre, Rio Cupe, 1 ♂ imm.

Pipra erythrocephala erythrocephala (Linnaeus)

Cana, 5 ♂, 2 ♀.

The race *actinosa* is perfectly distinct from typical *erythrocephala* in that the female is an obviously paler and grayer olive below. A large series from Santa Marta shows these characters equally clearly, and they would have to be called *actinosa* also, in spite of the fact that its distribution would apparently have to be discontinuous. In eastern Panama at least, *actinosa* is a common and characteristic forest bird ranging from Chiman at least to the lower half of the Tuyra River delta. The series from Cana is obviously a different subspecies, the females darker and more olive green, and both sexes slightly smaller, though the size differences claimed for the various races are minute. In other words, these Cana birds are indistinguishable from typical *erythrocephala*, which Dr. Chapman years ago (Distribution of Bird-Life in Colombia, 1917) recorded from the whole of Colombia west of the eastern Andes. The occurrence, then, of *erythrocephala* at Cana just across the boundary seems entirely possible, but the situation is further complicated by the recently described Santander race, *flammiceps* Todd, the male of which has a good character, though the female is as yet undescribed.

Pipra mentalis minor Hartert

Cana, 1 ♀.

No form of this species has hitherto been recorded from Panama east of the Canal Zone. The Colombian race is the one to be expected at Cana. The single female is distinctly as yellowish olive green as any specimen of *minor*, and the wing measures only 56.5 mm. It will be interesting to discover just how *erythrocephala* and *mentalis* divide the country between them in places where they occur together.

Corapipo altera altera Hellmayr

Cana, 2 ♂.

Manacus vitellinus vitellinus (Gould)

El Real, 1 ♂.

Manacus vitellinus viridiventris, subsp. nov.

Cana, 1 ♂, 2 ♀.

Type.— No. 124,545, M.C.Z.; 8 ad.; Jiminez, near Buenaventura, Pacific slope of western Colombia; April 6, 1907; M. G. Palmer.

Characters.— Resembling typical *Manacus vitellinus* of Panama (I here designate Lion Hill, Canal Zone, as a more exact type-locality), but yellow of throat and nuchal collar paler, less orange, approaching the paler *M. v. milleri* Chapman in this respect; remaining underparts darker, more olive and less yellowish on the center of the belly; in the latter respect the female even more obviously distinct.

Material examined

Manacus v. vitellinus.— Panama, from the Canal Zone to El Real, lower Tuyra River, 25 ♂, 6 ♀.

Manacus vitellinus viridiventris.— Panama, Cana, 1 ♂, 2 ♀; Colombia, Jiminez, 2 ♂, 2 ♀; Pavas, 1 ♂.

Remarks.— In reporting on Palmer's collection, Dr. Hellmayr (P.Z.S., 1911, p. 1141) comments on the single male specimen from Panama then available as being less green on the belly. In 1917 Dr. Chapman (Distribution of Bird-Life in Colombia, p. 487) thought that the belly might average paler in Canal Zone specimens "while the orange areas are most deeply colored in a specimen from Chorrera." The fine series of perfect skins now available from the Canal Zone shows these points very clearly and additional material from western Colombia emphasizes the distinctness of the females, which is of greater degree than that of the males. The paler bellied *milleri* is the opposite extreme from *viridiventris*. Typical *vitellinus* is really an intermediate between the distinct *aurantiacus* of western Panama and the west Colombian *viridiventris*. The specimens from Cana, eastern Panama, are distinctly intermediate, but nearer the Colombian form. Series from the upper Tuyra valley, therefore, do not properly represent this species.

Sapoyoa aenigma Hartert

Cana, 1 ♂.

Tityra semifasciata costaricensis Ridgway

El Tigre, Rio Cupe, 1 ♂.

This bird is distinctly intermediate between *costaricensis* and *columbiana*, the black patch on the inner web of the outer rectrix being about halfway between the average of the two forms. In smaller size and slightly grayer coloring, the Cana bird, however, is nearer *costaricensis*, and must be referred here provisionally until a series is available. A specimen from Jesusito farther west, however, is nearer *columbiana*.

ERATOR ALBITORQUES ALBITORQUES Du Bus

Cana, 1 ♂, 1 ♀.

The few specimens in existence from eastern Panama agree with Colombian and Ecuador specimens of true *albitorques*. From the Canal Zone northward in Central America the numerous specimens examined are obviously darker gray, less white, especially below, and the name *fraseri* (Kaup) is available for this well-marked race.

PACHYRHAMPHUS POLYCHROPTERUS CINEREIVENTRIS (Sclater)

Cana, 2 ♂, 2 ♀.

PACHYRHAMPHUS CINNAMOMEUS Lawrence

Cana, 6 ♂, 6 ♀.

LIPAUGUS HOLERYTHRUS HOLERYTHRUS Sclater and Salvin

El Tigre, Rio Cupe, 1 ♀

LANIOCERA RUFESCENS (Sclater)

El Real, 1 ♀.

While a rare bird in Central America, this species is frequent in eastern Panama.

COTINGA NATTERERI (Boiss.)

El Tigre, Rio Cupe, 1 ♂.

Large series of this gorgeous bird are now in existence from eastern Panama and western Colombia. It is undoubtedly a common bird in heavy forest, but a feeding tree must be found.

QUERULA PURPURATA (P. L. S. Müller)

El Real, 2 ♂; Cana, 1 ♂.

STELGIDOPTERYX RUFICOLLIS UROPYGIALIS (Lawrence)

Cana, 3 ♂.

HELEODYTES ALBOBRUNNEUS HARTERTI Berlepsch

El Real, 1 ♂; Cana, 1 ♂, 1 ♀.

THRYOPHILUS LEUCOTIS GALBRAITHI (Lawrence)

El Real, 1 ♂.

Thryophilus nigricapillus schotti Baird

El Tigre, Rio Cupe, 3 ♂; Cana, 1 ♂, 1 ♀.

A common and striking Wren of the more humid forests of eastern Panama, with a marked preference for reed-beds on the banks of rivers.

Pheugopedius spadix xerampelinus, subsp. nov.

Cana, 4 ♂, 3 ♀.

Type.— No. 140,510, M.C.Z.; breeding male; Cana, eastern Panama; April 13, 1928; Rex R. Benson.

Characters.— Similar to typical *Pheugopedius spadix* Bangs of western Colombia, but a paler and less richly colored bird; upperparts, wings and chest rufous instead of rich chestnut; sides and flanks much less reddish brown, and belly paler and grayer.

Remarks.— This very distinct species of Wren is rare and little known in collections. Apparently there are only two specimens on record from Colombia, one of which, the type, is before me. Dr. Chapman has already recorded seven specimens from Tacarcuna, eastern Panama, and the present series from Cana endorses his belief that the species must be much rarer in Colombia than in eastern Panama, where it appears to inhabit primarily the lowest edge of the Subtropical Zone. Panama specimens are separable at a glance from the type.

Pheugopedius fasciato-ventris albigularis (Lawrence)

Cana, 1 ♂.

Troglodytes musculus inquietus Baird

Cana, 1 ♂.

Henicorhina leucosticta darienensis Hellmayr

Cana, 3 ♂, 3 ♀.

Leucolepis phaeocephalus assimilis Todd

Cana, 1 ♀.

Myadestes coloratus Nelson

Cana, 1 immature ♂ (?).

Turdus obsoletus colombianus Hartert and Hellmayr

Cana, 1 ♂, 1 ♀.

Dr. Chapman (Distribution of Bird-life in Colombia, 1917, p. 536) has already shown the relationships of this form to the Central American

obsoletus. I am by no means sure, however, that adequate series of both Panama and Colombian specimens will not show the Panama bird to be separable. The two before me, however, are quite different, one being noticeably more chocolate brown than the other, thus approaching *obsoletus*.

VIREO FLAVOVIRIDIS FLAVOVIRIDIS Cassin

Cana 1 ♀.

COMPSOTHLYPIS PITIAYUMI NANA Griscom

Cana, 1 breeding ♀.

This Cana bird, the second known specimen, corroborates the characters assigned to the subspecies.

DENDROICA CASTANEA (Wilson)

El Tigre, Rio Cupe, 1 ♂, 1 ?; Cana, 1 ♂.

The Cana male was collected on April 6 and is in full breeding plumage.

OPORORNIS PHILADELPHIA (Wilson)

Cana, 2 ♂.

WILSONIA CANADENSIS (Linnaeus)

Cana, 1 ?.

SETOPHAGA RUTICILLA (Linnaeus)

Cana, 1 ♂.

BASILEUTERUS FULVICAUDA SEMICERVINUS Sclater

Cana, 2 ♂, 2 ♀.

SPOROPHILA SCHISTACEA SCHISTACEA (Lawrence)

Cana, 1 breeding ♂, 1 immature ♂.

A very rare and little known bird, recorded definitely only from the Canal Zone and northern Colombia.

SPOROPHILA AURITA AURITA (Bonaparte)

Cana, 3 ♂, 2 ♀.

VOLATINIA JACARINI ATRONITENS Todd

Cana, 2 ♂, 1 ♀.

PITYLUS GROSSUS (Linnaeus)

Cana, 1 ♂

SALTATOR MAXIMUS IUNGENS, subsp. nov.

Type.— No. 140,509, M.C.Z.; breeding ♂; Cana, eastern Panama; April 5, 1928; Rex R. Benson.

Characters.— Similar to typical *Saltator maximus* (P. L. S. Müller) of Colombia to Brazil, but connecting it with *Saltator intermedius* Lawrence of western Panama; intermediate in size; crissum yellower, less fulvous; differing from both allies in being a duller, less golden green on the upperparts.

Material Examined

Saltator maximus maximus.— Large series from Colombia to Brazil.

Saltator maximus iungens.— Cana, eastern Panama, 8 ♂, 4 ♀.

Saltator maximus intermedius.— Large series from southwest Costa Rica to the Canal Zone.

Remarks.— For many years in the literature, we found the well-known South American *Saltator maximus* compared with the Central American *S. magnoides*, a larger bird with black on the head, and a broad black breast band, separating the buff throat from the gray belly. Ridgway (Birds of North and Middle America, **1**, pp. 663–666) showed in 1901 that as we proceed southward in Central America, *S. magnoides* gradually loses the black on the head and the breast band decreases in width and extent. In specimens of *S. magnoides intermedius* from the Canal Zone, the breast band is reduced to a few spots or *disappears entirely*, although others possess one. So far as I am aware these extreme specimens of *intermedius* have never been compared with *S. maximus*, and no grounds whatever for specific distinctness exist. The case is an interesting one, as in other species of the group Chapman has already brought out similar cases of variation. As a whole, *S. intermedius* differs from *S. maximus* in being a darker purer gray below with a darker and more fulvous crissum and averages slightly larger. No records exist of a *Saltator* of this group in eastern Panama, and the bird here described is exactly intermediate in the slight characters just given above. In addition it happens to be a slightly less yellow green above than both its neighbors. As *maximus* has many years priority, all the Central American forms become races of it. I can see no grounds for keeping *S. magnoides medianus* and *intermedius* specifically distinct as Carriker has urged (Birds of Costa Rica,

p. 876). The two forms are admittedly distinct and a series of perfectly connecting intermediates is not known, but from Colombia to Mexico we have a series of representative forms gradually passing in orderly geographic sequence from one extreme to the other, and this far more important fact is obscured by making specific distinctions on a more or less arbitrary and artificial criterion.

Wing Measurements of Eight Males

maximus, 91.5–98 (94.8)
iungens, 93–102 (98.1)
intermedius, 94–106 (100.7)

SALTATOR STRIATIPICTUS STRIATIPICTUS Lafresnaye

Cana, 4 breeding ♂.

Not previously recorded from Panama, but the Colombian form was to be expected, provided the species occurred at all in extreme eastern Darien. My four specimens are absolutely typical.

ARREMONOPS STRIATICEPS STRIATICEPS Lafresnaye

Cana, 1 ♂, 3 ♀, 1 juv. ♂.

ARREMON AURANTIIROSTRIS STRICTOCOLLARIS Todd

Cana, 5 ♂, 3 ♀.

For other records of this race from eastern Panama, c/o Chapman, Amer. Mus. Novitates, No. 160, 1925, p. 6. The present series shows great variation in the width of the breast band.

BUARREMON ATRICAPILLUS TACARCUNAE Chapman

Cana, 11 ♂, 1 ♀.

This fine series is apparently the second collection of this recently proposed form. Two of the males have a few white feathers in the auricular region.

COEREBA MEXICANA COLUMBIANA (Cabanis)

Cana, 1 ♂, 1 ♀, 1 ♂ imm.

These specimens are typical examples of *columbiana*, a race appearing almost specifically distinct from true *mexicana*, were it not for well-marked intermediates from further down the Tuyra basin. Not previously recorded from Panama.

Chlorophanes spiza arguta Bangs and Barbour

Cana, 2 ♂, 3 ♀.

We have here the unusual case of a highly variable species, a subspecies of which ranges from Costa Rica to eastern Panama, ignoring the important faunal boundary of the Canal Zone as far as characters are concerned. These Cana specimens are absolutely indistinguishable from a Costa Rican series, and show no approach whatever to the blue *subtropicalis* of western Colombia.

Tersina viridis occidentalis (Sclater)

Cana, 2 ♂ ad., 5 ♂ imm., 2 ♀ ad.

The occurrence of this family in Central American territory has been generally overlooked, and goes back to an obscure statement by Oustalet in the Biologia Centrali Americana, **1**, p. 246. On this page there is the description by Oustalet in French of the unique type of *Dacnis viguieri*. By way of comment he states that this bird was obtained "sur les bords du golfe de Darien" with many other species, of which he lists six by their scientific names in brackets, and one of these is "*Procnias occidentalis*." This vague record was entirely overlooked by the recipients of the letter, the authors of the Biologia, and it is not surprising that it has escaped attention since.

The series listed above does not differ even minutely from a larger series of *occidentalis* from Colombia, Ecuador, Peru and Trinidad. In comparing them, however, I was surprised to discover that a fine series from Santa Marta showed obvious color differences, constituting a separable form, which is named below.

Tersina viridis grisescens, subsp. nov.

Type.— No. 106,300, M. C. Z.; ♀ ad.; La Concepcion, Santa Marta, Colombia; February 14, 1899; W. W. Brown.

Characters.— Adult male inseparable from *Tersina viridis occidentalis*, but females with the green a duller, paler and grayer shade throughout, not such a bright parrot or grass green, especially marked on the underparts, and obvious in comparable series; immature males with the green areas differing in the same respects as the female. Forty-four specimens examined.

Remarks.— Even with over one hundred specimens before me, I am at a loss to explain the plumages of the male *Tersina*, but two things

are apparent, based particularly on what I know to be the careful and competent sexing of Benson. In the first place the birds breeds when still in immature plumage, just like *Chlorophonia* and *Tanagra*. These partially immature breeding males are, however, quite different from two other males marked "immature" by Benson, which exactly resemble adult females, except that the barring of the abdomen is continued across the breast right up to the chin. Two females from eastern Ecuador are similar and it may be that this is a "first year" plumage, found in both sexes. The usual so-called immature male with patches of blue appearing in a hit or miss fashion may be a "second year" plumage, in which the bird unquestionably breeds. If so, we have here a case exactly analogous to *Tanagra*. In *Tersina* the majority of the "second year" males have the blue areas relatively dull, without the silky or satiny gloss so well known in the fully adult male, but apparently the gloss appears long before the green feathers are replaced by blue ones, as specimens that are less than half blue have begun to acquire this gloss. It may be coincidence, but it is suspicious that the three specimens before me having this gloss happen to be the breeding males from Panama. We know that this blue in *Tersina* disappears when the bird is wet, so that there must be some special feather structure, which apparently does not begin to develop until after a certain age has been reached. We have here an interesting problem for a microscopist with a sufficiently general knowledge of feather structure.

The great majority of the females examined have some scattered bluish feathers, or a bluish gloss somewhere. The females from Santa Marta average far more of this blue than my specimens of *occidentalis*, but this may be an accident, or it may be that some of them were wrongly sexed.

Tanagra olivacea humilis (Cabanis)

Cana, 2 ♂.

Tanagra fulvicrissa fulvicrissa (Sclater)

Cana, 1 ♀.

Tangara guttata eusticta Todd

Cana, 3 ♂, 3 ♀.

It was most surprising to receive a series of this Subtropical Zone tanager from extreme eastern Panama, and find that they were inseparable from the Costa Rica race, and showed no approach whatever to the Colombian forms. In fact these Cana birds are extremes of the

eusticta type, being more heavily spotted above and below and with more yellow on the head than the majority of a large series of topotypes.

Tangara inornata languens Bangs and Barbour

Cana, 4 ♂.

Tangara larvata fanny (Lafresnaye)

Cana, 1 ♂, 3 immature.

The Colombian race ranges into extreme eastern Panama at Cana and the upper Tuyra valley. The intermediate form *centralis* Berlepsch is entirely worthy of recognition and ranges from southern Nicaragua to the Canal Zone and east along the Pacific coast at least to the Chiman River.

Tangara gyroloides gyroloides (Lafresnaye)

Cana, 3 ♂, 4 ♀.

It seems now to be generally agreed to apply this name to the form inhabiting central and western Colombia, characterized by a less developed nape-ring, and a smaller, duller yellow shoulder-patch. In Costa Rica and western Panama a race *bangsi* Hellmayr has a broader nape-ring and a well-developed golden shoulder-patch. These characters reappear in western Ecuador, and lack of good series from one region or the other has induced both Hellmayr and Chapman to call west Ecuador birds *bangsi*. As a matter of fact they are separable in series, the Ecuador birds being obviously paler blue below and a shade paler chestnut on the head, especially on the sides. Great care, however, must be used to secure comparable specimens, as females and immature males of this species are always paler blue than breeding adult males. These differences were long ago pointed out by Bangs (Proc. New England Zool. Club, **6**, 1917, p. 76) who described the west Ecuador bird as *nupera* from Nanegal. Greatly increased material shows that it is a perfectly tenable form, which was apparently overlooked by Chapman, as it is not mentioned either in his discussion of this species or the synonymy in his Distribution of Bird-life in Ecuador.

A final point on the zone this species inhabits, as it is recorded from both the Tropical and Subtropical Zones. This bird *breeds* in the lower levels of the Subtropical Zone, in the mountains of western Panama, for instance, most abundantly at about the 3,500-foot level, where it is the commonest tree-top bird, and it does not range above 5,000 feet,

except where the original cloud forest has been destroyed to make coffee plantations, or some other special factor. In the non-breeding season it descends regularly to lower levels, and has even straggled to the Canal Zone, many miles from its nearest breeding mountains. At the moment I recall only two or three specimens captured there long years ago. One of these, in New York, is intermediate between *bangsi* and true *gyroloides*, but nearer the former. The other in Cambridge is much nearer *gyroloides*. The excellent series from Cana and another from Mt. Sapo are unquestionably *gyroloides*. There is no reason why both forms should not straggle to the Zone, and once the bird's life history is understood, the apparent contradiction is removed.

Thraupis cana cana (Swainson)

El Tigre, Rio Cupe, 1 ♂; Cana, 3 ♂, 2 ♀.

Birds from extreme eastern Panama are certainly referable to the typical form. From at least the Canal Zone westward Blue Tanagers are somewhat doubtfully referable to *diaconus*, a somewhat unsatisfactory race, the characters of which do not become definite until much further north in Central America.

Thraupis palmarum atripennis Todd

El Real, 1 ♂; Cana, 5 ♂, 2 ♀.

Ramphocelus icteronotus Bonaparte

El Real, 1 ♂; Cana, 3 ♂, 7 ♀.

Ramphocelus dimidiatus dimidiatus Lafresnaye

Cana, 3 ♂, 5 ♀.

Chlorothraupis olivacea (Cassin)

Cana, 1 ♂, 1 ♀.

Phoenicothraupis rubica vinacea (Lawrence)

Cana, 3 ♂, 2 ♀.

It is most interesting to discover this race of western Panama and western Costa Rica reappearing in extreme eastern Panama without any apparent subspecific change. The one adult female is, however, a shade browner and less green than the majority from western Panama.

Tachyphonus rufus (Boddaert)

Cana, 1 ♂.

Tachyphonus luctuosus panamensis Todd

El Real, 1 ♂; El Tigre, Rio Cupe, 1 ♂; Cana, 3 ♂, 2 ♀.

Chlorospingus inornatus (Nelson)

Cana, 1 ♂ at 2,600 ft. on Mt. Pirri.

Apparently the second time this species has ever been collected. It was originally described as a new genus, *Hylospingus*, differing from *Chlorospingus* in being a larger bird with much stouter bill, and heavier tarsi. When compared with the type species of the genus, *C. ophthalmicus* and its close allies in Central America and the Andes, there is no doubt that these characters are well marked. There are other rare and little known species of *Chlorospingus*, however, which have the same characters as *inornatus*, or connect it with the type of the genus by gradual stages. Thus *C. zeledoni* is slightly aberrant, in greater degree so is *C. semifuscus*, next comes *C. hypophaeus* of Veraguas, and last *C. flavipectus* of Colombia, and our transition from *Chlorospingus* to *Hylospingus* is complete. While admittedly a matter of opinion is involved, such a genus seems to me to serve no useful purpose. To those, however, who prefer to recognize such average structural differences, *Hylospingus* to be logically tenable would have to include *hypophaeus* and *flavipectus*. The color resemblances between *hypophaeus* and *inornatus* are sufficiently marked to infer that they represent each other on the two sides of the Panama fault at the Canal Zone.

Mitrospingus cassini cassini (Lawrence)

Cana, 1 ♂, 2 ♀.

Ostinops decumanus decumanus (Pallas)

El Tigre, Rio Cupe, 1 ♂; Cana, 1 ♂, 1 ♀.

Cacicus vitellinus vitellinus (Lawrence)

El Tigre, Rio Cupe, 1 ♂; Cana, 1 ♂, 1 ♀.

Amblycercus holosericeus holosericeus (Lichtenstein)

Cana, 4 ♂, 1 ♀.

Icterus mesomelas salvini Cassin

El Tigre, Rio Cupe, 1 ♂; Cana, 1 ♂.

Cyanocorax affinis zeledoni Ridgway

El Tigre, Rio Cupe, 2 ♂; Cana, 2 ♂, 2 ♀.

Distinctly paler, less creamy on the underparts, showing an approach to typical *affinis* of Colombia.

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XXXVI

DIE ABYSSALE UND PELAGISCHE GAMMARIDEN

VON A. SCHELLENBERG
(Zoolog. Museum Berlin)

WITH ONE PLATE.

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XXXVI

Die Abyssale und Pelagische Gammariden

Von A. Schellenberg

(Zoolog. Museum Berlin)

Die Gesamtausbeute umfasst nur 10 Arten. Da unter ihnen die kleine *Synopia ultramarina* durch zahlreiche Einzelexemplare vertreten ist, so darf man annehmen, dass die geringe Artenzahl nicht auf unvollständiger Auslese beruht, sondern dem tatsächlichen Fangergebnis entspricht.

Acht der erbeuteten Arten sind bereits bekannt. Nur eine Art (*Parandaniexis mirabilus*) und eine Form (*Rhachotropis palporum f. pacifica*) sind neu. Die erstere konnte mit *Andaniexis spinescens* (Alcock) indentisch sein. Ein Vergleich mit der Type, für deren freundliche Zusendung ich der Leitung des Zoological Survey of India bestens danke, überzeugte mich jedoch, dass es sich um verschiedene Arten handelt. Das Exemplar von *Rhachotropis palporum* musste ich als besondere Form von den atlantischen Vertretern abtrennen. Es ist aber nicht ausgeschlossen, dass diese Trennung bei umfangreicherem Material wegfällt.

Die sehr geringe Zahl neuer, vom Albatross in dem bisher noch kaum untersuchten Pazifik erbeuteten Arten ist auf die weite Verbreitung der pelagischen Gammariden zurückzuführen. Was die Albatross-Expedition an typisch pelagischen Arten mitbrachte, wurde bereits zuvor in anderen Meeren gefangen. Im folgenden seien die pelagischen Gammariden, die in mehreren Meeren nachgewiesen wurden, zusammengestellt, wobei ich darauf hinweisen möchte, dass sich unter ihnen keine bipolaren Arten befinden.

Übersicht der pelagischen, in mehreren Meeren nachgewiesenen Gammariden *

	Arktis	*Atlantik*	*Indik*	*Pazifik*	*Antarktis*
Cyphocaris richardi		+	+	+	+
Cyphocaris anonyx	+	+	+	+	
Cyphocaris challengeri		+	+	+	
Metacyphocaris helgae	+	+	+	+	
Paracallisoma alberti		+		+	+
Katius obesus	+	+	+	+	
Ichnopus pelagicus			+	+	
Parandania boecki		+	+		
Bathystegocephalus globosus		+	+		
Synopioides secundus		+		+	
Synopioides macronyx		+	+	+	
Synopia ultramarina		+	+	+	
Stenopleura atlantica		+	+		+
Eusiropsis riisei		+	+	+	

* Es sind nur die Arten aufgenommen, von denen eine pelagische Lebensweise feststeht.

Die pelagischen Gammariden lassen sich in 2 Gruppen teilen: Arten der Oberfläche und Arten der tieferen Wasserschichten. Zur ersten Gruppe gehört nur *Synopia ultramarina*. Sie ist eine Warmwasserart, die in allen 3 Ozeanen vorkommt. Da sie im Nordatlantik bis in der Höhe der Azoren erbeutet wurde, so ist es nicht ausgeschlossen, dass sie auch um das Kap der Guten Hoffnung herumwandern kann. Wahrscheinlich stellt sie jedoch ein Überbleibsel der alten circumaequatorialen Meeresfauna dar, denn die isolierte Stellung dieser auf 2 Arten beruhenden Familie mit ihrer starken Anpassung an das pelagische Leben spricht für ihr hohes Alter. Bei den übrigen weitverbreiteten Arten handelt es sich entweder um echte Bewohner des Abyssals, wie z. B. *Bathystegocephalus globosus* oder wenigstens um solche der tieferen d. h. kühleren Wasserschichten. Ein Austausch zwischen den einzelnen Meeren ist daher sehr wahrscheinlich. Dass bisher noch nicht sämtliche Arten aus allen 3 Meeren nachgewiesen wurden, sagt bei der Seltenheit mancher Arten noch nichts gegen ein panozeanisches Vorkommen.

Die reich vertretene *Cyphocaris richardi* ist auffallender Weise von der Expedition nur in einem relativ kleinen Gebiet gefunden worden. Es wird im Norden etwa durch den 5. Grad südlicher Breite, im Süden durch den 15. Grad, im Osten durch das Festland und im Westen durch den 88. Grad westlicher Länge begrenzt.

Fam. LYSIANASSIDAE

1. Cyphocaris richardi Chevreux

1926, Schellenberg, Wiss. Ergeb. d. Tiefsee Exped., Bd. 23, p. 206 (Literatur und Verbreitung)

Sta. 4648	9.XI 04	7 p.m.	4°43′S.	87°7.5′W.	300–0 Fd.	9°C*	1 Exemplar 19 mm.
Sta. 4650	10.XI 04	7 p.m.	5°22′S.	84°39′W.	300–0 Fd.	9°C	1 juv. 9.5 mm.
Sta. 4655	12.XI 04	7 p.m.	5°57.5′S.	80°50′W.	400–0 Fd.	7°C	1 juv. 9 mm. 1 Exemplar 25 mm.
Sta. 4661	15.XI 04	7 p.m.	10°17′S.	88°2′W	300–0 Fd.	8–9°C	1 juv. 6 mm.
Sta. 4664	17.XI 04	8 a.m.	11°30.3′S.	87°19′W.	300–0 Fd.	7–8°C	1 Exemplar 18 mm.
Sta. 4665	17.XI 04	7 p.m.	11°45′S.	86°5.2′W.	300–0 Fd.	7–8°C	1 Exemplar 30 mm.
Sta. 4667	18.XI 04	7 p.m.	11°59.5′S.	83°40.4W.	300–0 Fd.	7–8°C	4 juv. 8–13.5 mm.
Sta. 4671	20.XI 04	7 p.m.	12°6.9′S.	78°28.2′W.	300–0 Fd.	7–8°C	1 juv. 6 mm.
Sta. 4675	22.XI 04	7 p.m.	12°54′S.	78°33′W.	300–0 Fd.	7°C	1 juv. 13.5 mm. 1 Exemplar 19 mm.
Sta. 4676	5.XII 04	8 a.m.	14°28.9′S.	81°24′W.	300–0 Fd.	7°C	1 juv. 10.5 mm.

2. Cyphocaris anonyx Boeck.

1926, Schellenberg, Wiss. Ergeb. d. Tiefsee Exped., Bd. 23, p. 210 (Literatur und Verbreitung)

Sta. 4681	8.XII 04	8 a.m.	18°47.1′S.	89°26′W.	300–0 Fd.	7°C	5 juv. 6.5–11 mm.
Sta. 4683	9.XII 04	8 a.m.	20°2.4′S.	91°52.5′W.	300–0 Fd.	7, 5°C	4 juv. 7–9 mm.
Sta. 4691	13.XII 04	8 a.m.	25°23.7′S.	103°29.3′W.	300–0 Fd.	6–7°C	1 juv. 7 mm.
Sta. 4705	28.XII 04	8 a.m.	15°5.3′S.	99°19′W.	300–0 Fd.	7°C	1 juv. 7 mm.
Sta. 4722	16.I 05	8 a.m.	9°31′S.	106°30.5′W.	300–0 Fd.	7, 5°C	juv. 6.5–7 mm.
Sta. 4728	19.I 05	8 a.m.	13°47 5′S.	114°21.6′W.	300–0 Fd.	7°C	1 juv. 7 mm.

3. Cyphocaris challengeri Stebb.

1926, Schellenberg, Wiss. Ergeb. d. Tiefsee Exped., Bd. 23, p. 212 (Literatur und Verbreitung)

Sta. 4736	23.I 05	8 a.m.	19°04′S.	125°5.4′W.	300–0 Fd.	6.7°C	1 juv. 9 mm.

4. Cyphocaris faurei Barnard

1926, Schellenberg, Wiss. Ergeb. d. Tiefsee Exped., Bd. 23, p. 215 (Literatur und Verbreitung)

Sta. 5	30.VIII 99	22°42′N.	131°54′W.	100–0 Fd.		1♂20 mm.
Sta. 16	9.IX 99	2°38′N.	137°22′W.	250–0 Fd.		2♀ 17 & 22 mm. Exemplar decapitiert
Sta. 4701	26.XII 04	19°11.5′S.	102°24′W.	300–0 Fd.	7°C	1 juv. 8 mm.
Sta. 4742	15.II 05	0°3.4′N.	117°15.8′W.	300–0 Fd.	7.5°C	1 Exemplar decapitiert

* Die Temperaturangaben beziehen sich auf die grösste Tiefe der durchfischten Schicht.

5. Metacyphocaris helgae Tattersall

1926, Schellenberg Wiss. Ergeb. d. Tiefsee Exped., Bd. 23, p. 216 (Literatur und Verbreitung)

Sta. 4711 31.XII 04 8 a.m. 7°47.5′S. 94°5.5′W. 300–0 Fd. 7.5°C 1 Exemplar 9 mm.

6. Ichnopus pelagicus Schellbg.

1926, Schellenberg Wiss. Ergeb. d. Tiefsee Exped., Bd. 23, p. 218.

Sta. 4679 7.XII 04 8 a.m. 17°26′S. 86°46′W. 300–0 Fd. ca. 6.5°C 1♂ 10.5 mm.
Sta. 4701 26.XII 04 8 a.m. 19°11.5′S. 102°24′W. 300–0 Fd. 6.5°C 1♂ 10 mm.
Sta. 4703 27.XII 04 8 a.m. 17°18.6′S. 100°52.3′W. 300–0 Fd. ca. 7°C 1♂ 10 mm.
Sta. 4707 29.XII 04 8 a.m. 12°33.2′S. 97°42′W. 300–0 Fd. 7°C 1♂ jung 6 mm.
Sta. 4711 31.XII 04 8 a.m. 7°47.5′S. 94°5.5′W. 300–0 Fd. 7.5°C 1♀ mit Embryonen 11 mm., 1♂ 10.5 mm. 1 juv. 7 mm.
Sta. 4736 23.I 05 8 a.m. 19°0.4′S. 125°5.4′W. 300–0 Fd. 6.7°C 1♀ 11 mm., 1 juv. 8.5 mm.

Vorkommen: Indik 10°8′S. 97° 15′ W. 2400–0 m.

Fam. STEGOCEPHALIDAE

Die vielen Abänderungen und Erweiterungen, denen die Familie seit Stebbings Bearbeitung im "Tierreich" unterworfen war, lassen es wünschenswert erscheinen, einen revidierten Gattungsschlüssel aufzustellen:

Schlüssel der Gattungen

1 (20) Mandibel gezähnt 2
2 (15) Telson gespalten 3
3 (4) II Maxille ohne Aussenlade . . . . . *Bathystegocephalus* Schellbg.
4 (3) II Maxille mit Aussenlade 5
5 (6) II Palpusglied des Maxillarfusses innen distal ausgezogen *Phippsia* Stebb.
6 (5) II Palpusglied des Maxillarfusses innen distal nicht ausgezogen 7
7 (10) Palpus der I Maxille 2 gliedrig 8
8 (9) Basis des VI Pereiopoden nicht verbreitert *Phippsiella* Schellbg.
9 (8) Basis des VI Pereiopoden verbreitert *Stegocephalopsis* Schellbg.
10 (7) Palpus der I Maxille 1 gliedrig 11
11 (12) Basis des VI Pereiopoden nicht verbreitert *Stegocephaloides* Sars
12 (11) Basis des VI Pereiopoden verbreitert 13

13 (14) Lippen und I Maxille nicht verlängert. Stacheln an der Aussenlade der II Maxille mit Haken . . . . *Stegocephalus* Kröyer
14 (13) Lippen und I Maxille lang und schmal. Stacheln an der Aussenlade der II Maxille ohne Haken *Stegocephalina* Stephensen
15 (2) Telson ungespalten 16
16 (19) VII Pereiopod 7 gliedrig 17
17 (18) Innenladen des Maxillarfusses erreichen kaum das I Palpusglied . . . . . *Andaniopsis* Sars
18 (17) Innenladen des Maxillarfusses erreichen das II Palpusglied *Andaniella* Sars
19 (16) VII Pereiopod 3 gliedrig . . . . . *Tetradeion* Stebb.
20 (1) Mandibel ungezähnt 21
21 (24) Telson gespalten 22
22 (23) I Geisselglied der I Antenne kürzer als der Stiel. V. Stielglied der II Antenne kürzer als das IV* . . . . . *Andanites* Stebb.
23 (22) I Geisselglied der I Antenne länger als der Stiel. V. Steilglied der II Antenne länger als das IV* . . . . . *Euandania* Stebb.
24 (21) Telson ungespalten 25
25 (26) IV Pereiopod deutlich subchelat . . . . . *Parandaniexis*, n. g.
26 (25) IV Pereiopod einfach 27
27 (28) Palpus der I Maxille 2 gliedrig . . . . . *Andaniexis* Stebb.
28 (27) Palpus der I Maxille 1 gliedrig . . . . . *Parandania* Stebb.

Parandaniexis gen. nov.

Wie *Andaniexis* (Tierreich, p. 94), jedoch Augen fehlend. Oberlippe nicht eingebuchtet. Lappen der Unterlippe breit abgerundet. Innenladen des Maxillarfusses überragen nicht den Basalteil der Aussenladen. Metacarpus des I Gnathopoden nicht länger, der des II nur wenig länger als der Carpus. IV Pereiopod subchelat. Unterrand der Coxa schräg aufwärts ziehend. Basis des VII Pereiopoden erreicht den gut entwickelten Merus. Telson länger als breit.

Die Zahl der Astglieder des III Uropoden liess sich nicht sicher feststellen.

7. Parandaniexis mirabilis spec. nov.

Fig. 1

Sta. 4705 28.XII 04 8 a.m. 15°5.3′S. 99°19′W. 2031 Fd. +1.75° C
1 ♀ mit Bruttlamellen 30 mm.

* Die Schlüsseldiagnose zeigt dass bisher keine vollwertigen Unterscheidungsmerkmale von den beiden Gattungen bekannt sind. Die von Stebbing angegebenen Unterschiede sind nicht zu verwenden.

Das Integument ist lederartig, der Körper deformiert. Der Kopf ist kurz. Seine Seiten reichen weit abwärts. Sein Scheitel ist nur halb so lang wie das I Mesosomsegment. Die Kopfseitenlappen springen rundlich etwa bis zum II Glied der I Antenne vor. Augen fehlen. Das I Mesosomsegment ist fast so lang wie die beiden folgenden zusammen. Sein Vorderrand ist vollständig glatt. Die Länge der übrigen Mesosomsegmente ist untereinander nicht sehr verschieden. Der Hinterrand der Metasomsegmente und des I Urussegmentes trägt dorsal einen spitzen Zahn. Am I und II Metasomsegment ist er klein und rückwärts gerichtet. Er überragt kaum den Hinterrand und bildet die Fortsetzung einer an den Enden der Segmente angedeuteten Carina. Das III Metasomsegment trägt eine deutliche Carina. Sein Zahn ist gross und aufwärtsgerichtet. Am I Urussegment ist der Zahn ähnlich geformt, doch kleiner und ohne Carina. Das I Urussegment ist vor dem Zahn eingesattelt. Das kleine Telson ist abgerundet dreieckig, länger als breit und etwa $\frac{1}{3}$ so lang wie der Stiel des III Uropoden.

Die Antennen sind kurz und dünn. Die I Antenne kommt an Länge etwa den beiden ersten Mesosomsegmenten gleich. Sie reicht bis zum Stielende der II. Ihr Stiel ist sehr kurz. Er ist etwas kürzer als das lange I Geisselglied. Das II Stielglied ist etwa halb so lang wie das walzenförmige I Glied, das III halb so lang wie das II und von diesem teilweise verdeckt. Die fünfgliedrige Geissel ist über doppelt so lang wie der Stiel. Das I Geisselglied ist so lang wie das II–IV. Es verjüngt sich gleichmässig. Unten trägt es Borstenbüschel und distal einen starken Stachel. Ein gleicher Stachel und einige schwächere stehen an der Unterseite der unter sich gleich langen II und III Geisselglieder. Das IV Glied ist so lang wie das II und III und unterseits mit einigen kurzen Stacheln besetzt. Das V Glied ist stachelförmig und am kürzesten. Die eingliedrige Nebengeissel überragt die Mitte des I Gliedes der Hauptgeissel. Ihr Ende trägt mehrere lange Stachelborsten. Das IV Stielglied der II Antenne ist sehr kurz, das V Glied etwa so lang wie die 16 gliedrige Geissel.

Die Oberlippe ist nicht zweilappig sondern in der Mitte ganz kurz und breit vorgezogen. Die Lappen der Unterlippe sind breiter und die Mandibularfortsätze länger als bei *Andaniexis abyssi* (Sars, Account, Taf. 71, Fig. 2). Die übrigen Mundteile gleichen weitgehend den Abbildungen, die Sars von dieser Art giebt. Die Innenlade der I Maxille trägt 16 Fiederborsten, die Aussenlade 9 glatte Stacheln, deren Spitzen z. T. abgebrochen sind. Die Stachlen am II Palpusglied ziehen sich vom Palpusende bis in die Mitte des Innenrandes. Der Innenrand an der Innenlade der II Maxille trägt aussen eine Reihe Fiederborsten,

innen eine Reihe kürzerer Stacheln. Die Innenladen des Maxillarfusses überragen nicht den Basalteil der Aussenlade. Ihre Innenränder sind mit einander verwachsen. Distal sind die Laden bestachelt aber ungezähnt. Die Aussenladen sind distal abgestutzt und auch hier bestachelt.

Die Coxae sind für eine Stegocephalide ungewöhnlich klein. Die 3 ersten ähneln denen von *A. abyssi*, nur sind sie kürzer im Vergleich zur Höhe der Mesosomsegmente und ausserdem laufen die II und III Coxen nicht scharf zu. Die IV Coxa (Fig. 1a) hat die Form eines Schlächterbeiles mit schräg nach aufwärts ziehendem Unterrande, so dass der nicht konkave Teil des Hinterrandes stark verkürzt ist. Der unter dem Ausschnitt der IV Coxa liegende Vorderlappen der V Coxa ist etwas schmäler und kaum halb so lang wie der Hinterlappen. Die VI Coxa (Fig. 1b) ist viereckig, die VII etwa abgerundet dreieckig. Die Gnathopoden gleichen denen von *A. abyssi*, doch ist der I Gnathopod etwas schlanker. Der Metacarpus ist etwas schmäler und etwas kürzer als der Carpus. Am II Gnathopoden ist der Carpus fast so lang wie der Metacarpus. Der III Pereiopod ist etwas kräftiger als der von Sars gezeichnete IV von *A. abyssi*. Der IV Pereiopod (Fig. 1a) weicht von dem der übrigen Stegacephaliden dadurch vollständig ab, dass er zu einer typischen Greifextremität geworden ist. Sein Carpus verbreitert sich distal und ist an seinem Hinterrande lang bestachelt. Der etwa gleich lange Metacarpus trägt in der Mitte seines Hinterrandes einen breiten rundlichen Lappen, dessen Rand mit 2 Reihen kurzer Stacheln dicht besetzt ist. Drei weitere Stacheln stehen nahe dem Dactylus. Das Ende des kräftigen, schwach gekrümmten und nicht sehr spitzen Dactylus schlägt sich gegen die Mitte des Lappens ein, sodass zwischen Dactylus und dem distalen Teil des Metacarpus eine klaffende Lücke bleibt. Der Innenrand des Dactylus ist fein gekörnt. Die Basis des V Pereiopoden ist oblong, etwas breiter als der Merus. Der Carpus trägt am Vorderrande eine Reihe kräftiger Stacheln. Eine zweite Reihe ist auf die Innenseite des Gliedes verschoben. Zwischen beiden Stachelreihen läuft eine Furche. Der Metacarpus ist etwas länger als der Carpus. Sein Vorderrand ist ebenfalls kräftig aber einreihig bestachelt. Der Dactylus ist etwa $\frac{2}{3}$ so lang wie der Metacarpus und an seinem Innenrande gekörnt. Der VI Pereiopod (Fig. 1b) ist länger als der V. Die Basis ist ebenfalls oblong und kaum breiter als die des V. Auch die übrigen Glieder ähneln denen des vorhergehenden Pereiopoden, doch ist der Metacarpus wesentlich länger und schlanker als der Carpus. Ausser dem sind die letzten $\frac{2}{3}$ des Innenrandes am Dactylus beborstet. Die Basis des VII Pereiopoden ist

annähernd elliptisch, distal verschmälert, aber kaum ausgezogen. Der Hinterrand ist weit und niedrig gesägt. Das III–VII Glied ist etwa so lang wie die Basis. Merus, Carpus and Metacarpus sind etwa gleich lang. Der Vorderrand des Carpus und Metacarpus ist kräftig bestachelt. Der Dactylus ist kaum halb so lang wie der Metacarpus.

Pleopoden ohne Besonderheit.

Die Uropoden reichen alle gleich weit. Auch die Stiele schliessen in gleicher Höhe ab. Die Spitzen der Äste sind fast alle abgebrochen. Der Längenunterschied zwichen Aussen = und Innenästen kann nur gering gewesen sein. Auch die Äste des III Uropoden sind, soweit erhalten, eingliedrig.

Fam. SYNOPIIDAE

8. Synopia ultramarina Dana

1926, Schellenberg, Deutsch. Südpolar Exped., Bd. 18, p. 341 (Literatur und Verbreitung)

Butaritari, Gilbert Is. Lagoon surface light 6. I 1900, 4 ♂.

Sta. 4607	17.X	04	7.22	p.m.	12°N.	91°30′W.	surface	28.3°C	1 ♀
Sta. 4648	9.XI	04	7	p.m.	4°43′S.	87°7.5′W.	surface	21.7°C	1 ♂
Sta. 4712	31.XII	04	8	a.m.	5°35.3′S.	92°21.6′W.	surface	22.8°C	1 ♂
Sta. 4714	1.I	05	8	p.m.	4°19′S.	91°28.5′W.	surface	23.9°C	1 ♂
Sta. 4718	13.I	05	8	p.m.	5°32.4′S.	99°32.2′W.	surface	23.9°C	2 ♂

Fam. EUSIRIDAE

9. Eusiropsis riisei Stebb.

1926, Schellenberg, Deutsch. Südpolar Exped., Bd. 18, p. 351 (Literatur und Verbreitung)

Sta. 4736	23.I	05	8	a.m.	19°0.4′S.	125°5.4′W.	300–0 Fd.	6.7°C
							1 Exemplare, 9 mm.	
Sta. 4742	15.II	05	8	a.m.	0°3.4′N.	117°15.8′W.	300–0 Fd.	7.5°C
							1 Exemplare, 9 mm.	
Sta. 4705	28.XII	04	8	a.m.	15°5.3′S.	99°19′W.	2031–0 Fd.	+1.75°C
							1 ♀ mit Brutlamellen 30 mm.	

10. Rhachotropis palporum Stebb. f. pacifica form. nov.

Sta. 4721 15.I 05 S a.m. 8°7 5′S. 104°10.5′W. 2084 Fd. 1 exemplare, 25 mm.

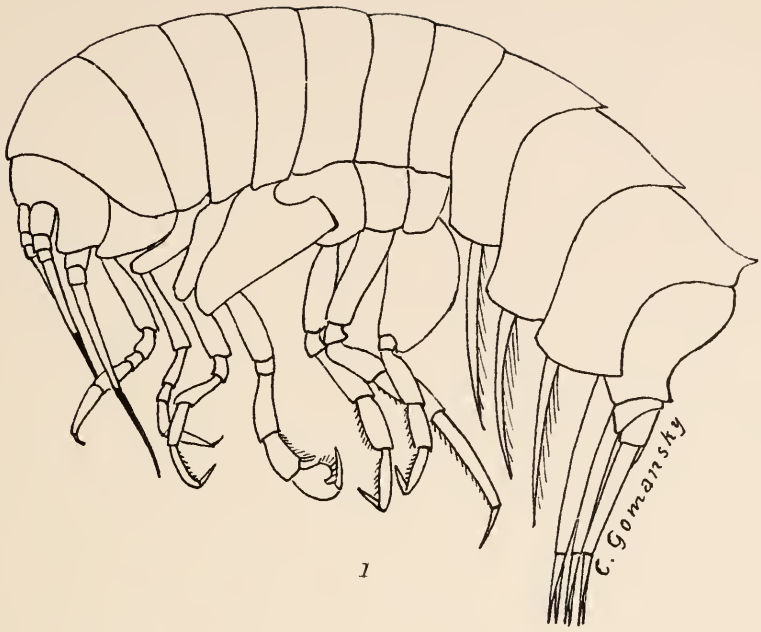
(Die 3 hinteren Pereiopoden des Tieres sind am Merus abgebrochen.)

Das Exemplar entspricht nicht ganz der Beschreibung Stebbings (1908, Journ. Linn. Soc., London, Bd. 30, p. 194, Taf. 28) und Barnards (1916, Ann. S. Afric. Mus., Bd. 15, p. 179) von *Rhachotropis palporum*, doch sind die Abweichungen so gering, dass sie zur Aufstellung einer neuen Art unzureichend erscheinen, immerhin aber auch keine zweifelsfreie Vereinigung der Formen gestatten. Folgende Abweichungen bestehen:—

Die Kopfseitenlappen enden spitz und nicht abgestumpft. Die Seitenkontur des Kopfes gleicht der Abbildung, die Sars (Account, Taf. 150C) von *Rh. helleri* gibt. Die Posterolateralecken des VI Mesosomsegmentes sind ebenfalls zahnförmig. Der Posterolateralzahn des I und II Metasomsegmentes ist etwas kürzer als von Stebbing abgebildet. Der kleine über ihm stehende Zahn fehlt ganz. Die I Antennen sind etwas so lang wie der Kopf + Mesosom. Sie reichen bis über die Geisselmitte der II Antennen. Das I und II Stielglied ist etwa gleich lang, das III ist $\frac{1}{3}$ so lang wie das II. Die Geissel ist etwa so lang wie der Stiel und 13 gliedrig. Die Nebengeissel ist warzenförmig, eingliedrig und trägt eine Endborste. Das IV Stielglied der II Antenne ist etwas kürzer als das V, aber wesentlich länger als das I Glied der I Antenne. Das III Glied des Mandibelpalpus ist $\frac{5}{7}$ so lang wie das II Glied und trägt am Ende mehrere starre Borsten. Es hat etwa die gleiche Form wie bei den meisten Arten der Gattung. Der Innenrand am II Palpusglied des Maxillarfusses ist nicht konkav. Das proximale Palmarende der Gnathopoden trägt eine kleine zahnförmige Erhebung. Die V und VI Coxa besitzen einen grösseren abgerundeten Hinterlappen. Der Zahn am Hinterrande der Basis der 3 letzten Pereiopoden steht zu Beginn des distalen Drittels. Ausserdem ist der Zahn des letzten Pereiopoden genau wie die vorhergehenden geformt, im übrigen aber nur wenig grösser.

Der Typus der Art ist im Atlantik (59° 36′N. 7°W.) in 400 m und südlich des Kaps in 1340 und 450–550 m erbeutet worden. Die Grösse der Exemplare lag zwischen 12 und 13.5 mm., betrug also nur etwa die Hälfte der pazifischen Form.

PLATE



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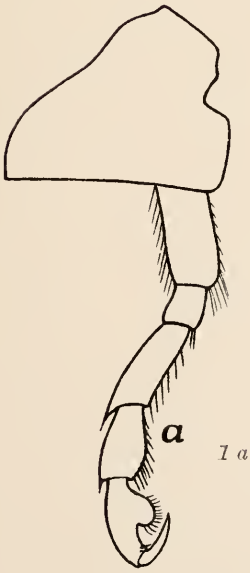

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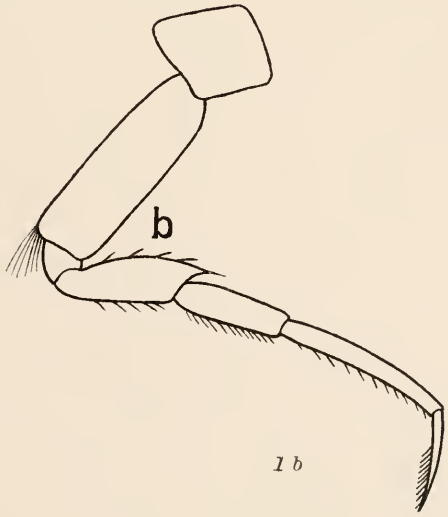

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Bulletin of the Museum of Comparative Zoölogy
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TYPICAL REPTILES AND AMPHIBIANS

By Thomas Barbour and Arthur Loveridge

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June, 1929

PUBLICATIONS

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY

AT HARVARD COLLEGE.

There have been published of the BULLETIN Vols. I. to LIV., LVI. to LXVIII.; of the MEMOIRS, Vols. I. to XLII., and also XLIV. to XLIX., and LI.

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M.C.Z.

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TYPICAL REPTILES AND AMPHIBIANS

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PRINTED FOR THE MUSEUM.
June, 1929

No. 10.— *Typical Reptiles and Amphibians in the Museum of Comparative Zoölogy*

By Thomas Barbour and Arthur Loveridge

Since many inquiries are made concerning types which may or may not be found in the collection of this Museum, it has seemed desirable to prepare a catalogue of such specimens. The collection has been searched for possible types and the literature likewise examined. A few types which may yet be identified — which should be here — have been included in the enumeration. The arrangement is purely alphabetical, with cross references where change of names has occurred. Designated types have been called holotypes; holotype and paratypes is the designation where a particular specimen from a series has been chosen for description, and cotypes where no individual was so chosen. Where holotype and paratypes are listed, the former is put first in a separate paragraph.

This paper is the result of notes which have accumulated during many years. For copying many of these I thank Miss Thelma MacIntyre of Kentucky University and for much assistance in arranging the cross references I owe gratitude to Miss Harriet Biddle. My secretary, Miss Helene M. Robinson, has also assisted in conning many of the earlier published papers for possible references to specimens in the collection.

The number of type species is 1,473, and this number is increasing fast, as every effort is being made to secure typical material by exchange. The reptile collection itself at this date contains almost exactly 850 genera and 4,700 species. Wherever a number of specimens are listed as "holotype and paratypes," the first is the holotype. This list was prepared and completed for publication some five or six years ago, but the opportunity to bring it forth did not present itself. Latterly other duties have prevented my bringing it to date, and I have associated Mr. Loveridge's name in co-authorship since he has done this within the past few months. T. Barbour.

A word regarding arrangement is necessary. The first number is that of the Museum of Comparative Zoölogy Register. The early entries were made by lots and individual numbers were not given to specimens. The number next in order indicates the number of specimens. The locality follows and then the name of collector and the source from which the material was received. The year is that in which the specimens were received at the Museum.

ABLEPHARUS BOUTONI ATRA Boettger COTYPES
= CRYPTOBLEPHARUS BOUTONII ATRA (Boettger)

17629–30. Two. Grand Comoro Id. A. Voeltzkow. Exch. Senck. Mus. 1905.

IN VOELTZKOW'S "REISE OST-AFR.," **3**, 1913, p. 338.
Good condition. Described as "var. *atra*."

ABLEPHARUS HETEROPUS Garman HOLOTYPE
= CRYPTOBLEPHARUS HETEROPUS (Garman)

6484. One. Great Barrier Reef, Queensland, Australia. A. Agassiz. Great Barrier Reef Exped. 1896.

BULL. MUS. COMP. ZOÖL., **39**. 1901, p. 9.
Condition excellent.

ABLEPHARUS HETERURUS Garman COTYPES
= CRYPTOBLEPHARUS BOUTONII HETERURUS (Garman)

1102. Two. Apaiang, Gilbert Id. Andrew Garrett. Purchased. 1862.

BULL. MUS. COMP. ZOÖL., **39**, 1901, p. 11.
Condition fair.

ABLEPHARUS VIRGATUS Garman HOLOTYPE
= CRYPTOBLEPHARUS VIRGATUS (Garman)

6485. One. Cooktown, Australia. A. Agassiz. Great Barrier Reef Exped. 1896.

BULL. MUS. COMP. ZOÖL., **39**, 1901, p. 10.
In excellent preservation.

?AELUROSAURUS BRUNNEUS (Cope). HOLOTYPE
See PENTADACTYLUS BRUNNEUS Cope

AGAMA COLONORUM USAMBARAE Barbour and Loveridge
HOLOTYPE AND PARATYPES

24129. One. Soni, Lushoto, Usambara Mts., Tanganyika Territory. A. Loveridge, T. Barbour. 1927.
24130–39. Ten. Soni, Lushoto, Usambara Mts., Tanganyika Territory. A. Loveridge, T. Barbour. 1927.

MEM. MUS. COMP. ZOÖL., **50**, 1928, p. 150, pl. 2, fig. 1.
Type in excellent state of preservation, paratypes only moderately good.

AGAMA LIONOTUS DODOMAE Loveridge PARATYPES

18565–71 and 18574–75. Ten. Dodoma, etc., Tanganyika Territory. A. Loveridge, T. Barbour. 1924.

PROC. ZOÖL. SOC. LOND., 1923, p. 944.
Beautifully preserved. Described as "var. *dodomae*."

AGAMA LIONOTUS MWANZAE Loveridge PARATYPES

18576–86. Eleven. Mwanza and Shanwa, Tanganyika Territory. A Loveridge, T. Barbour. 1924.

PROC. ZOÖL. SOC. LOND., 1923, p. 945.
Condition excellent. Described as "var. *mwanzae*."

AGAMA MOSSAMBICA MONTANA Barbour and Loveridge HOLOTYPE AND PARATYPES

24089. One. Bagilo, Uluguru Mts., Tanganyika Territory. A. Loveridge, T. Barbour. 1927.
24086–88 and 24090–127. Thirty-nine. Numerous localities in the Uluguru and Usambara Mts. A. Loveridge, T. Barbour. 1927.

MEM. MUS. COMP. ZOÖL., **50**, 1928, p. 147.
Excellent condition.

AGAMURA CRURALIS Blanford COTYPE

7136. One. Baluchistan. W. T. Blanford. Exch. Indian Mus. 1908.

ANN. MAG. NAT. HIST. (4) **13**, 1874, p. 455.
Somewhat soft and bleached.

AGKISTRODON BLOMHOFFII INTERMEDIUS (Strauch). See TRIGONOCEPHALUS INTERMEDIUS Strauch. COTYPE

AGKISTRODON STRAUCHI (Bedriaga). See AGKISTRODON TIBETANUS Barbour. HOLOTYPE

AGKISTRODON TIBETANUS Barbour HOLOTYPE
= AGKISTRODON STRAUCHI (Bedriaga)

7327. One. Rama-la Pass, 13,000 ft. Near Ta-chien-lu, West Szechuan, China. W. R. Zappey, J. E. Thayer. 1909.

MEM. MUS. COMP. ZOÖL., **40**, 1912, p. 133.
Condition fair, a young example.

AIPYSURUS APRAEFRONTALIS Malcolm Smith PARATYPES

23477, 24900, Two. Ashmore Reefs, Timor Sea. Malcolm Smith, T. Barbour. 1927.

MONOG. SEA-SNAKES, 1926, p. 24, text fig. 13.
Excellent condition.

AIPYSURUS FOLIOSQUAMA Malcolm Smith PARATYPES

23492–97. Six. Ashmore Reefs, Timor Sea. Malcolm Smith, T. Barbour. 1927.

MONOG. SEA-SNAKES, 1926, p. 24, text figs. 11, 12.
Excellent condition.

ALGIROIDES ALLENI Barbour HOLOTYPE AND PARATYPE

9280. One. Timberline, N. E. slope of Mt. Kenya, Kenya Colony. G. M. Allen. Allen, Brooks and Smith Exped. 1909.
9281–83. Three. Timberline, N. E. slope of Mt. Kenya, Kenya Colony. G. M. Allen. Allen, Brooks and Smith Exped. 1909.

PROC. N. ENG. ZOÖL. CLUB, **4**, 1914, p. 97.
The four specimens are in fair condition only.

ALSOPHIS ANEGADAE Barbour HOLOTYPE AND PARATYPE

12083. One. Anegada, Br. W. I. J. L. Peters. Mus. Exped. 1917.
12098. One. Anegada, Br. W. I. J. L. Peters. Mus. Exped. 1917.

PROC. BIOL. SOC. WASH., **30**, 1917, p. 102.
Fair condition.

ALSOPHIS ANGULIFER (Bibron). See DROMICUS ANGULIFER Bibron COTYPE

ALSOPHIS BROOKSI Barbour COTYPES

7893. Two. Little Swan Id. off Honduras, Caribbean Sea. George Nelson. Museum Exped. 1912.

MEM. MUS. COMP. ZOÖL., **44**, 1914, p. 333.
In good preservation.

ALSOPHIS BRUESI Barbour COTYPES
= DRYMOBIUS BODDAERTI (Sentzen)

7792. Five. St. George, Grenada, Br. W. I. G. M. Allen, T. Barbour. 1910.

MEM. MUS. COMP. ZOÖL., **44**, 1914, p. 337.
Condition fair.

ALSOPHIS CAYMANUS Garman COTYPES

6020. Five. Grand Cayman, Br. W. I. W. B. Richardson. Purchased 1887.

PROC. AMER. PHIL. SOC., **24**, 1887, p. 276.
Condition fair to poor.

ALSOPHIS CINEREUS Garman COTYPES

6126. Seven. St. Barts., Fr. W. I. F. Lagois and Branch. Purchased. 1879.
6139. Seven. Anguilla, Br. W. I. F. Lagois and Branch. Purchased. 1879.

PROC. AMER. PHIL. SOC., **24**, 1887, p. 282.
Very fair condition.

ALSOPHIS FUSCICAUDA Garman. COTYPE

6235. One. Cayman Brac, Br. W. I. C. J. Maynard. Purchased. 1888.

BULL. ESSEX INST., **20**, 1888, p. 106.
In good condition.

ALSOPHIS PULCHER Garman HOLOTYPE
= DRYMOBIUS BODDAERTII (Sentzen)

6146. One. Testigos Id., N. W. from Trinidad.

PROC. AMER. PHIL. SOC., **24**, 1887, p. 283.
Scales slipping, but fairly well preserved.

ALSOPHIS SANCTORUM Barbour HOLOTYPE AND PARATYPES

10689. One. Terre d'en Haut, Iles des Saintes, Guadeloupe, Fr. W. I. G. K. Noble. Museum Exped. 1914.
10681–88 and 10690–92. Eleven. Terre d'en Haut, Iles des Saintes, Guadeloupe, Fr. W. I. G. K. Noble. Museum Exped. 1914.

PROC. BIOL. SOC. WASH., **28**, 1915, p. 78.

ALSOPHIS VUDII Cope

New Providence Id., Bahamas, Br. W. I.

PROC. ACAD. NAT. SCI. PHILA., 1862, p. 74.
The type of this species cannot be found in Salem, Boston, Cambridge, or Philadelphia.
See *Ameiva thoracica* for note *re* missing type.

ALSOPHYLAX TUBERCULATUS (Blanford). See BUNOPUS TUBERCULATUS Blanford. COTYPE

ALTIRANA PARKERI Stejneger PARATYPE

11636. One. Yatong, Tibet. Exch. Brit. Mus. 1925.

JOUR. WASH. ACAD. SCI., **17**, 1927, p. 318.
Well preserved.

AMBLYCEPHALUS CHINENSIS Barbour HOLOTYPE

7326. One. Lu-lu-ping, West Szechuan, China. W. R. Zappey, J. E. Thayer. 1909.

MEM. MUS. COMP. ZOÖL., **40**, 1912, p. 132.
Well preserved.

AMBLYRHYNCHUS NANUS Garman COTYPE

9398. One. Tower Id., Galapagos Id. G. Baur. Exch. Clark Univ. 1913.

BULL. ESSEX INST., **24**, 1892, p. 80.
A young specimen or possibly really a dwarfed form. Competent field observing would settle this point. The type is about one third the size of an adult *Amblyrhynchus cristatus* and was "said to be adult."

AMBYSTOMA EPIXANTHUM COPE COTYPE
= AMBYSTOMA MACRODACTYLUM Baird

4900. One Atlanta, Idaho, U. S. A. E. D. Cope. Exch. Phila. Acad. Nat. Sci. 1919.

PROC. ACAD. NAT. SCI. PHILA., 1883, p. 16.

AMBYSTOMA MACRODACTYLUM Baird. See AMBYSTOMA EPIXANTHUM Cope. COTYPE

AMEIVA ABBOTTI Noble PARATYPES

17676–77. Two. Beata Id., Santo Domingo. G. K. Noble. Exch. Amer. Mus. Nat. Hist. 1922.

AMER. MUS. NOVIT., **64**, 1923, p. 1.
Well preserved.

AMEIVA AMEIVA BILINEATA Barbour and Noble PARATYPE

10924. One. Dunoon, Demerara R., British Guiana. A. G. Ruthven. Exch. Univ. Mich. Mus. 1915.

BULL. MUS. COMP. ZOÖL., **49**, 1915, p. 464.
Excellent preservation.

AMEIVA AMEIVA LAETA (Cope). See AMEIVA LAETA Cope COTYPES

AMEIVA AMEIVA MELANOCEPHALA Barbour and Noble HOLOTYPE AND PARATYPES

9993. One. Cumanacoa, Venezuela. W. H. Phelps. W. H. Phelps. 1896.

9994–95. Two. Cumanacoa, Venezuela. W. H. Phelps. W. H. Phelps. 1896.

BULL. MUS. COMP. ZOÖL., **49**, 1915, p. 465.
Well preserved.

AMEIVA AQUILINA Garman COTYPES

6088. Seven. St. George, Grenada, Br. W. I. S. Garman. Blake Exped. 1879.

6089. Twenty-five. Kingston, St. Vincent, Br. W. I. S. Garman. Blake Exped. 1879.

BULL. ESSEX INST., **19**, 1887, p. 3.
In good condition.

AMEIVA ATRATA Garman HOLOTYPE

6084. One. Redonda Id., Br. W. I. Dr. W. J. Branch. Dr. W. J. Branch. 1880.

BULL. ESSEX INST., **19**, 1887, p. 8.
In good shape.

AMEIVA ATRIGULARIS Garman COTYPES

6079–80. Ten. Trinidad. C. S. Cazabon. Purchased. 1879.

BULL. ESSEX INST., **19**, 1887, p. 2.
Condition fair to good.

AMEIVA BARBOURI Cochran HOLOTYPE AND PARATYPE

25537. One. La Source, Gonave Id., Haiti. W. J. Eyerdam. T. Barbour. 1927.

25538. One. La Source, Gonave Id., Haiti. W. J. Eyerdam. T. Barbour. 1927.

PROC. BIOL. SOC. WASH., **41**, 1928, p. 56.
Good condition.

AMEIVA BIFRONTATA BIFRONTATA (Cope) COTYPE

10770. One. "St. Thomas, West Indies" [Venezuela or Colombia]. Exch. Phila. Acad. Nat. Sci. 1915.

PROC. ACAD. NAT. SCI. PHILA., 1862, p. 67.
Condition good.

AMEIVA CINERACEA Barbour and Noble HOLOTYPE AND PARATYPES

10577. One. Grand Isle off Guadeloupe, Fr. W. I. G. K. Noble. Museum Exped. 1914.

10575–76. Two. Grand Isle off Guadeloupe, Fr. W. I. G. K. Noble. Museum Exped. 1914.

BULL. MUS. COMP. ZOÖL., **49**, 1915, p. 453.

In rather poor condition.

AMEIVA CORVINA Cope COTYPES

5531. One. Sombrero Id., W. I. Peabody Mus., Salem. 1886.

10535. One. Sombrero Id., W. I. Hanson. Exch. Phila. Acad. Nat. Sci. 1911.

3613, 3616. Two. ?Jeremie, Haiti. "D. F. Weinland." "Gray Fund." 1859.

PROC. ACAD. NAT. SCI. PHILA., 1861, p. 312.

The last two specimens (there were formerly four) were returned by Cope with the Weinland Collection, which he was studying the year *A. corvina* was described. They undoubtedly represent the specimens which were loaned him by the Smithsonian Institution, being part of the Riise Collection, since those specimens can not be found there now. Two have been sent to the National Collection and two retained. They came from Sombrero Island. The Salem specimen was received long ago from the Philadelphia series probably. It bore Cope's label originally.

AMEIVA FUSCATA Garman COTYPES

6087. Two. Dominica, Br. W. I. S. Garman. Blake Exped. 1879.

BULL. MUS. COMP. ZOÖL., **19**, 1887, p. 5.

In good condition.

AMEIVA GARMANI Barbour HOLOTYPE

6141. One. Anguilla Id., Br. W. I. F. Lagois. F. Lagois. 1880.

MEM. MUS. COMP. ZOÖL., **44**, 1914, p. 312.

In good condition. The species has subsequently appeared on neighboring islands.

AMEIVA GRISWOLDI Barbour HOLOTYPE AND PARATYPES

11945. One. St. John's, Antigua, Br. W. I. D. W. Griswold. D. W. Griswold. 1916.

11943–44. Two. St. John's, Antigua, Br. W. I. D. W. Griswold. D. W. Griswold. 1916.

PROC. BIOL. SOC. WASH., **29**, 1916, p. 216.

In perfect condition.

AMEIVA INSULANA Ruthven HOLOTYPE

14025. One. Testigos Id., Venezuela. Unknown. Boston Soc. Nat. Hist. 1917.

OCC. PAPERS MUS. ZOÖL. UNIV. MICH., **149**, 1924, p. 1.
In very good condition.

AMEIVA LAETA Cope = AMEIVA AMEIVA LAETA (Cope) COTYPES

10536–37. Two. Rio Janeiro, Brazil. L. Agassiz. Thayer Exped. 1866.

PROC. ACAD. NAT. SCI. PHILA., 1862, p. 65.
Soft but showing characters well.
The types were retained by Cope and subsequently, after many years, restored to the custody of the Museum of Comparative Zoölogy by the Academy of Natural Sciences of Philadelphia, Cope's legatee.

AMEIVA MAYNARDI Garman COTYPES

6225. Two. Inagua Id., S. Bahamas, Br. W. I. C. J. Maynard. Purchased. 1888.

BULL. ESSEX INST., **20**, 1888, p. 110.
Condition extremely poor.

AMEIVA PANCHLORA Barbour PARATYPE

14293. One. Old Providence Id., Bahamas, Br. W. I. Albatross Exped. Exch. U. S. Nat. Mus. 1921.

PROC. N. ENG. ZOÖL. CLUB, **7**, 1921, p. 83.
Condition satisfactory.

AMEIVA PLUVIANOTATA Garman COTYPES

6086. Eight. Plymouth, Montserrat, Br. W. I. S. Garman. Blake Exped. 1879.

BULL. ESSEX INST., **19**, 1887, p. 6.
Well preserved.

AMEIVA RUTHVENI Barbour and Noble HOLOTYPE AND PARATYPES

10927. One. Near city of Panama, Republic of Panama. W. W. Brown. J. E. Thayer. 1905.
10925–26. Two. Near city of Panama, Republic of Panama. W. W. Brown. J. E. Thayer. 1905.

BULL. MUS. COMP. ZOÖL., **49**, 1915, p. 471.
Fairly well preserved.

AMEIVA TAENIURA Cope COTYPES

3614. Three. Jeremie, Haiti. D. F. Weinland. Purchased. 1859.

PROC. ACAD. NAT. SCI. PHILA., 1862, p. 63.
In poor condition.

AMEIVA THORACICA Cope

New Providence Id., Bahamas, Br. W. I.

PROC. ACAD. NAT. SCI. PHILA., 1862, p. 64.
Cope says types in Philadelphia Academy and Salem Museum. The latter collection transferred to the Museum of Comparative Zoölogy contained no specimens of this species. Not to be found now in Philadelphia.

AMEIVA UNDULATA PARVA Barbour and Noble
HOLOTYPE AND PARATYPE

5831. Two. Guatemala. ♂ Holotype, ♀ Paratype. ?Van Patten.

BULL. MUS. COMP. ZOÖL., **49**, 1915, p. 476.
Fairly well preserved.

AMPHIBOLURUS BARBATUS MINOR Sternfeld COTYPE

22418. One. Finke River, Central Australia. Exch. Senck. Mus. 1926.

MITT. SENCKENB. GES., **1**, 1919, p. 78.

AMPHISBAENA CAUDALIS Cochran HOLOTYPE AND PARATYPE

25550. One. Grand Caymite Id., Haiti. W. J. Eyerdam. T. Barbour. 1927.

25551. One. Grand Caymite Id., Haiti. W. J. Eyerdam. T. Barbour. 1927.

PROC. BIOL. SOC. WASH., **41**, 1928, p. 58.
Good condition.

AMPHISBAENA INNOCENS Weinland COTYPES

3624–25. Two. Jeremie, Haiti. D. F. Weinland. Purchased. 1859.

ABH. SENCKENB. NATURF. GES., **4**, 1862, p. 137, pl. 5, fig. 2.
In fine preservation.

AMPHISBAENA MANNI Barbour HOLOTYPE AND PARATYPES

8645. One. Cape Haitien, Haiti. W. M. Mann. Museum Exped. 1913.

8646–47. Two. Cape Haitien, Haiti. W. M. Mann. Museum Exped. 1913.

MEM. MUS. COMP. ZOÖL., **44**, 1914, p. 318.
In excellent condition.

AMPHISBAENA PERICENSIS Noble HOLOTYPE AND PARATYPES

14631. One. Perico, Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.
14764–68, 14770, 14772–80. Fifteen. Perico, Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.
14789–90. Two. Bellevista, Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.

ANN. N. Y. ACAD. SCI., **29**, 1921, p. 141.
A large series, all well preserved.

AMPHISBAENA RIDLEYI Boulenger COTYPE

10789. One. Fernando Noronha, Brazil. Dr. Ridley. Exch. British Mus. 1915.

JOUR. LINN. SOC. LOND., **20**, 1890, p. 481.
In perfect condition.

AMPHISBAENULA ORIENTALIS Sternfeld COTYPE AND GENOTYPE

21904. One. Mikindani, Tanganyika Territory. H. Grote. Exch. Zoöl. Mus. Berlin. 1925.

SITZBER. GES. NATURF. FREUNDE BERLIN, 1911, p. 246.
Somewhat shrunken.

AMYDA EMORYI (Agassiz). See ASPIDONECTES EMORYI Agassiz COTYPES

AMYDA FEROX (Schneider). See ASPIDONECTES ASPER Agassiz COTYPES

AMYDA SPINIFERA (Lesueur). See ASPIDONECTES NUCHALIS Agassiz COTYPES

ANOLIS AHLI Barbour HOLOTYPE AND PARATYPES

19905. One. Electric plant, 1,500 ft., Trinidad Mts., Cuba. E. R. Dunn. T. Barbour. 1925.
19906–07. Two. Electric plant, 1,500 ft., Trinidad Mts., Cuba. E. R. Dunn. T. Barbour. 1925.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1925, p. 168.
Fairly well preserved.

ANOLIS ALBIPALPEBRALIS Barbour HOLOTYPE AND PARATYPES
= ANOLIS MOOREI Cope

11954. One and eighteen paratypes. Grand Turk, Bahamas, Br. W. I. L. A. Mowbray. L. A. Mowbray. 1916.

PROC. BIOL. SOC. WASH., **29**, 1916, p. 215.
The whole series is well preserved.

ANOLIS ALLISONI Barbour HOLOTYPE AND PARATYPES

26725. One. Ruatan Id., Bay Is., Honduras. T. Barbour. T. Barbour. 1928.

26726–55. Thirty-seven. Ruatan Id., Bay Is., Honduras. T. Barbour. T. Barbour. 1928.

PROC. N. ENG. ZOÖL. CLUB, **10**, 1928, p. 58.
Excellent condition.

ANOLIS ALLOGUS Barbour and Ramsden HOLOTYPE AND PARATYPES

8544. One. Bueycito; Oriente, Cuba. V. J. Rodriquez. T. Barbour. 1913. Many paratypes from various localities.

MEM. MUS. COMP. ZOÖL., **47**, 1919, p. 159.
The type is a beautiful adult male. Many of the paratypes are poorly preserved and immature.

ANOLIS ALUTACEUS Cope as ANOLIS (DRACONTURA) ALUTACEUS Cope COTYPE

10932. One. Monte Verde, E. Cuba. Charles Wright. Exch. U. S. Nat. Mus. 1915.

PROC. ACAD. NAT. SCI. PHILA., 1861, p. 212.
Soft and tailless.

ANOLIS ANTIQUAE Barbour HOLOTYPE AND PARATYPE

10624. One. St. John's, Antigua, Br. W. I. G. K. Noble. Museum Exped. 1914.

10625. One. St. John's, Antigua, Br. W. I. G. K. Noble. Museum Exped. 1914.

PROC. BIOL. SOC. WASH., **28**, 1915, p. 74.
Fairly well preserved.

ANOLIS ASPER Garman COTYPES

6162. Nineteen. Marie Galante Id., Fr. W. I. W. B. Richardson. Purchased, 1886.

BULL. ESSEX INST., **19**, 1887, p. 31.
Well preserved but only two or three adults.

ANOLIS AUREOLUS Cope — COTYPE

10929. One. Yucatan. A. Schott. Exch. U. S. Nat. Mus. 1915.

PROC. AMER. PHIL. SOC., **22**, 1885, p. 390.
Poorly preserved.

ANOLIS BARBUDENSIS Barbour — HOLOTYPE AND PARATYPE

16167. One. Barbuda, Br. W. I. W. R. Forrest. W. R. Forrest. 1921.
16168. One. Barbuda, Br. W. I. W. R. Forrest. W. R. Forrest. 1921.

OCC. PAPERS MUS. ZOÖL. UNIV. MICH., **132**, 1923, p. 4.
The type is a giant adult male.

ANOLIS BOCOURTII Cope — COTYPES

12443, 14943–45. Three. Peru. J. Orton. Exch. Acad. Nat. Sci. Phila. 1920–21.
14942. One. Nauta, Peru. J. Orton. Exch. Acad. Nat. Sci. Phila. 1921.

JOUR. ACAD. NAT. SCI. PHILA., (2), **8**, 1876, p. 167.
Soft, poorly preserved.

ANOLIS BONAIRENSIS Ruthven — PARATYPES

17470–71. Two. Bonaire, Dutch W. I. H. B. Baker. Exch. Univ. Mich. Mus. 1923.

OCC. PAPERS MUS. ZOÖL. UNIV. MICH., **143**, 1923, p. 4.
Excellent condition.

ANOLIS BREMERI Barbour — HOLOTYPE

7889. ♂. Herradura, Pinar del Rio, Cuba. T. Barbour. T. Barbour. 1912.

MEM. MUS. COMP. ZOÖL., **44**, 1914, p. 288.
An adult male, unique, well preserved.

ANOLIS CINEREUS Garman = ANOLIS ROQUET (Lacépède) — COTYPES

6182. Nineteen. St. George, Grenada, Br. W. I. S. Garman. Blake Exped. 1879.

BULL. ESSEX INST., **19**, 1887, p. 35.
Good series, well preserved.

ANOLIS COELESTINUS Cope as ANOLIS (CTENOCERCUS) COELESTINUS Cope — COTYPE

3347. One. Jeremie, Haiti. D. F. Weinland. Purchased. 1865.

PROC. ACAD. NAT. SCI. PHILA., 1862, p. 177.
Fair condition.

ANOLIS CONCOLOR Cope as ANOLIS (GASTROTROPUS) CONCOLOR Cope COTYPE

22341. One. Nicaragua. C. Wright. Exch. U. S. Nat. Mus. 1926.

PROC. ACAD. NAT. SCI. PHILA., 1862, p. 180.
Poor condition.

ANOLIS CONSPERSUS Garman COTYPES

6021. Seventy-three. Grand Cayman, Br. W. I. W. B. Richardson. Purchased. 1887.

PROC. AMER. PHIL. SOC., 1887, p. 273.
Well preserved.

ANOLIS CRISTATELLUS Duméril and Bibron COTYPE

2171. One. No locality? "Type 17." Exch. Paris Mus. through A. A. Duméril. 1865.

ERP. GÉN., **4**, 1837, p. 143.
Faded but usable.

ANOLIS CRISTATELLUS Duméril and Bibron. Also see ANOLIS SCRIPTUS Garman. COTYPES

ANOLIS CUPREUS Hallowell COTYPES

17631–32. Two. Nicaragua. C. Wright. Exch. U. S. Nat. Mus. 1923.

PROC. ACAD. NAT. SCI. PHILA., 1860, p. 481.
Soft, fair condition.

ANOLIS CYBOTES Cope COTYPES

3619, 14346–47. Three. Jeremie, Haiti. D. F. Weinland. Purchased. 1859.

PROC. ACAD. NAT. SCI. PHILA., 1862, p. 177.
14346–7 were retained by Cope and subsequently after many years restored to the custody of the Museum of Comparative Zoölogy by the Academy of Natural Sciences of Philadelphia, Cope's legatee.

ANOLIS CYBOTES Cope. Also see ANOLIS HAETIANUS Garman COTYPES

ANOLIS DORIS Barbour HOLOTYPE AND PARATYPES

13737. One. La Gonave Id., Haiti. G. M. Allen. T. Barbour. 1919.
13734–36, 13738–40 } Six. La Gonave Id., Haiti. G. M. Allen. T. Barbour. 1919.

PROC. BIOL. SOC. WASH., **38**, 1925, p. 101.
Good to fair condition.

ANOLIS EXTREMUS Garman = ANOLIS ROQUET (Lacépède) COTYPES

2743. Eleven. Bridgetown, Barbadoes, Br. W. I. L. Agassiz et al. Hassler Exped. 1872.
6183. Seventeen. Bridgetown, Barbadoes, Br. W. I. S. Garman. Blake Exped. 1879.

BULL. ESSEX INST., **19**, 1887, p. 35.
A fine series.

ANOLIS FORRESTI Barbour HOLOTYPE

16170. One. Barbuda, Br. W. I. W. R. Forrest. W. R. Forrest. 1915.

OCC. PAPERS MUS. ZOÖL. UNIV. MICH., **132**, 1923, p. 4.
Well preserved.

ANOLIS GENTILIS Garman = ANOLIS ROQUET (Lacépède) COTYPES

6163. Nineteen. Grenadines, Petit Martinique, Br. W. I. S. Garman. Blake Exped. 1879.

BULL. ESSEX INST., **19**, 1887, p. 34.
A good series.

ANOLIS GINGIVINUS Cope. See ANOLIS VIRGATUS Garman COTYPES

ANOLIS GODMANI Boulenger COTYPES

17687. One. Guatemala. F. D. Godman. Exch. British Mus. 1917.
17688. One. Irazu region, Costa Rica. Godman and Salvin. Exch. British Mus. 1917.

CAT. LIZARDS BRIT. MUS., **2**, 1885, p. 85.
Fair preservation.

ANOLIS GORGONAE Barbour COTYPES

6984. Two. Gorgona Id., Colombia. W. W. Brown. J. E. Thayer. 1905.

BULL. MUS. COMP. ZOÖL., **46**, 1905, p. 99.
Soft, only fair condition.

ANOLIS GREYI Barbour HOLOTYPE AND PARATYPES

7890. One. Camaguey, Cuba. T. Barbour. T. Barbour. 1909.
7442. Two. Camaguey, Cuba. T. Barbour. T. Barbour. 1909.

MEM. MUS. COMP. ZOÖL., **44**, 1914, p. 287.
Well preserved. This series, formerly larger, was taken in the garden of the old Camaguey Hotel.

ANOLIS GRISEUS Garman COTYPES

6164. Seven. St. Vincent, Br. W. I. S. Garman. Blake Exped. 1879.

BULL. ESSEX INST., **19**, 1887, p. 36.
A well-conditioned suite.

ANOLIS HAETIANUS Garman — ANOLIS CYBOTES Cope COTYPES

6191. Three. Tiburon, Haiti. S. Garman. Blake Exped. 1879.

BULL. ESSEX INST., **19**, 1887, p. 42.
Dried up, in poor shape.

ANOLIS LEMNISCATUS Boulenger COTYPE

16783. One. Chimbo, Ecuador. W. F. H. Rosenberg. Exch. British Mus. 1922.

PROC. ZOÖL. SOC. LOND., 1898, p. 113, pl. 10, fig. 4.
Fair condition.

ANOLIS LEUCOPHAEUS Garman HOLOTYPE

6226. One. Inagua, S. Bahamas, Br. W. I. C. J. Maynard. Purchased. 1888.

BULL. ESSEX INST., **20**, 1888, p. 109.
Badly shrunken and dried.

ANOLIS LINDENI Ruthven HOLOTYPE

8306. One. Santarem, Brazil. Charles Linden. Thayer Exped. 1866.

PROC. BIOL. SOC. WASH., **25**, 1912, p. 163.
A fine specimen.

ANOLIS LIVIDUS Garman COTYPES

6176. Thirty-five. Montserrat, Br. W. I. S. Garman. Blake Exped. 1879.

BULL. ESSEX INST., **19**, 1887, p. 43.
A well-preserved series.

ANOLIS LONGITIBIALIS Noble PARATYPE

17686. One. Beata Id., Santo Domingo. G. K. Noble. Exch. Amer. Mus. Nat. Hist. 1922.

AMER. MUS. NOVIT., **64**, 1923, p. 4.
Well preserved.

ANOLIS LUCIAE Garman. COTYPES

6173, 6175. Twenty-one. Castries, St. Lucia, Br. W. I. S. Garman. Blake Exped. 1879.

BULL. ESSEX INST., **19**, 1887, p. 44.
An excellent series.

ANOLIS LUTEOSIGNIFER Garman. COTYPES

6228. Nine. Cayman Brac Id., Br. W. I. C. J. Maynard. Purchased. 1888.

BULL. ESSEX INST., **20**, 1888, p. 4.
In good condition.

ANOLIS MAYERI Fowler = ANOLIS MOOREI Cope PARATYPE

11850. One. Virgin Ids., W. I. Prof. H. D. Brown. Exch. Princeton Univ. 1916.

CARNEGIE INST. WASH. PUBL., **252**, 1918, p. 8, fig. 4.
Fair condition.

ANOLIS MAYNARDI Garman COTYPES

6227. Two. Little Cayman Id., Br. W. I. C. J. Maynard. Purchased. 1888.

BULL. ESSEX INST., **20**, 1888, p. 7.
Rather poorly preserved.

ANOLIS MESTREI Barbour and Ramsden HOLOTYPE AND PARATYPE

11285. One. Luis Lazo, Cuba. T. Barbour. T. Barbour. 1915.
11286. One. Luis Lazo, Cuba. T. Barbour. T. Barbour. 1915.

PROC. BIOL. SOC. WASH., **29**, 1916, p. 19.
Well preserved.

ANOLIS MOOREI Cope. See ANOLIS ALBIPALPEBRALIS Barbour; ANOLIS MAYERI Fowler HOLOTYPE AND PARATYPES

ANOLIS NELSONI Barbour HOLOTYPE AND PARATYPES

7892. One. Swan Id. off Honduras, Caribbean Sea. George Nelson. Mus. Exped. 1912. About a hundred paratypes.

MEM. MUS. COMP. ZOÖL., **44**, 1914, p. 287.
A beautiful series.

ANOLIS NUBILIS Garman COTYPES

6181. Three. Redonda Id., Br. W. I. W. B. Richardson. Mus. Exped. 1879.

BULL. ESSEX INST., **19**, 1887, p. 32.
In good condition.

ANOLIS POLYLEPIS Peters COTYPES

21962–63. Two. Progreso, Chiriqui Prov., Panama. Ribbe. Exch. Zoöl. Mus. Berlin. 1925.

MONATSBER. AKAD. WISS. BERLIN, 1873, p. 738.
In fair condition.

ANOLIS QUADRIOCELLIFER Barbour and Ramsden HOLOTYPE AND PARATYPES

11867. One. Ensenada de Cajon, Cabo San Antonio, W. Cuba. C. de la Torre. C. de la Torre. 1914.

11906–07. Two. Ensenada de Cajon, Cabo San Antonio, W. Cuba. C. de la Torre. C. de la Torre. 1914.

MEM. MUS. COMP. ZOÖL., **47**, 1919, p. 158.
Well-preserved specimens from the "Tomas Barrera Expedition."

ANOLIS ROQUET (Lacépède). See ANOLIS CINEREUS (Garman) HOLOTYPE

ANOLIS EXTREMUS (Garman) COTYPES

ANOLIS GENTILIS (Garman) COTYPES

ANOLIS RUBRIBARBUS Barbour and Ramsden HOLOTYPE AND PARATYPES

11868. One. Cananova, near Sagua de Tanamo, Cuba. V. J. Rodriguez. C. de la Torre. 1916.

11908–12. Three. Cananova, near Sagua de Tanamo, Cuba. V. J. Rodriguez. T. Barbour. 1916.

MEM. MUS. COMP. ZOÖL., **47**, 1919, p. 156.
Fairly well preserved; the type perfect.

ANOLIS SABANUS Garman COTYPES

6161. Five. Saba, Dutch W. I. F. Lagois. Purchased. 1884.

BULL. ESSEX INST., **19**, 1887, p. 39.
Good condition.

ANOLIS SAGRAEI Duméril and Bibron COTYPE

2172. One. Cuba. Exch. Paris Mus. through A. A. Duméril. 1865.

ERP. GÉN., **4**, 1837, p. 149.
In very good condition considering the age of the specimen.

ANOLIS SAGRAEI Duméril and Bibron. Also see ANOLIS SCRIPTUS Garman. COTYPE

ANOLIS SCRIPTUS Garman = ANOLIS CRISTATELLUS + ANOLIS SAGREI COTYPES

972–73. Five. "Silver and Lena Keys, Florida, U. S. A." L. Agassiz. 1862.

Lena Keys = Cayos de la Leña, Cuba. Silver Keys = ?

BULL. ESSEX INST., **19**, 1887, p. 28.
By some mix-up of labels, these specimens were supposed to have come from the Florida Keys. The cotype from Cuba (Cayos de la Leña) represents *Anolis sagraei* and subsequently bore the manuscript name of *Anolis flabellifer* ms. probably of Cope. The other specimens doubtless really came from Porto Rico.

ANOLIS SOLIFER Ruthven HOLOTYPE

6549. One. La Concepcion, Santa Marta Mts., Colombia. W. W. Brown. O. Bangs. 1899.

OCC. PAPERS MUS. ZOÖL. UNIV. MICH., **32**, 1916, p. 4, pl. 2.
In fine preservation.

ANOLIS SOLITARIUS Ruthven PARATYPE

12053. One. Palomina, Santa Marta Mts., Colombia. W. W. Brown. O. Bangs. 1904.

OCC. PAPERS MUS. ZOÖL. UNIV. MICH., **32**, 1916, p. 2, pl. 1.
Well preserved.

ANOLIS SPECIOSUS Garman COTYPES

6172. Five. Marie Galante Id., Fr. W. I. W. B. Richardson. Purchased. 1886.

BULL. ESSEX INST., **19**, 1887, p. 42.
A good series.

ANOLIS STRATULUS Cope COTYPE

21217. One. St. Thomas, W. I. R. Swift. Exch. Acad. Nat. Sci. Phila. 1925.

PROC. ACAD. NAT. SCI. PHILA., 1861, p. 209.
Soft, poorly preserved.

ANOLIS TERRAE-ALTAE Barbour HOLOTYPE AND PARATYPES

10627. One. Terre d'en Haut, Isles des Saintes, Guadeloupe, Fr. W. I. G. K. Noble. Museum Exped. 1914.
10628–30. Three. Terre d'en Haut, Isles des Saintes, Guadeloupe, Fr. W. I. G. K. Noble. Museum Exped. 1914.

PROC. BIOL. SOC. WASH., **28**, 1915, p. 76.
A well-preserved set.

ANOLIS TROSSULUS Garman COTYPES

6181. Twelve. St. George, Grenada. Br. W. I. S. Garman. Blake Exped. 1879.

BULL. ESSEX INST., **19**, 1887, p. 14.
An excellent series.

ANOLIS UNIFORMIS Cope COTYPE

10933. One. Guatemala. H. Hague. Exch. U. S. Nat. Mus. 1915.

PROC. AMER. PHIL. SOC., **22**, 1885, p. 392.
Soft and ill-preserved.

ANOLIS VINCENTI Garman COTYPES

6178. Twenty-two. St. Vincent, Br. W. I. W. B. Richardson. Museum Exped. 1879.
6179. Forty-seven. St. Vincent, Br. W. I. S. Garman. Blake Exped. 1879.

BULL. ESSEX INST., **19**, 1887, p. 46.
A fine series.

ANOLIS VIRGATUS Garman = ANOLIS GINGIVINUS Cope COTYPES

6165. Ten. St. Barts, Fr. W. I. F. Lagois. Purchased. 1884.

BULL. ESSEX INST., **19**, 1887, p. 41.
In good preservation.

APARALLACTUS ULUGURUENSIS Barbour and Loveridge
HOLOTYPE AND PARATYPES

23363. One. Nyange, Uluguru Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.
23364–65. Two. Nyange, Uluguru Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.
23366–70. Five. Amani, Usambara Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.

MEM. MUS. COMP. ZOÖL., **50**, 1928, p. 132.
Excellent condition.

ARISTELLIGER LAR Cope HOLOTYPE

3607. One. Jeremie, Haiti. D. F. Weinland. Purchased. 1875.

PROC. ACAD. NAT. SCI. PHILA., 1861, p. 497.
A fine large adult. No. 1504 was an earlier catalogue number.

ARISTELLIGER NELSONI Barbour HOLOTYPE AND PARATYPES

7891. One. Swan Id. off Honduras. George Nelson. Museum Exped. 1912.
9601–21. Fifteen. Swan Id. off Honduras. George Nelson. Museum Exped. 1912.

MEM. MUS. COMP. ZOÖL., **44**, 1914, p. 258.
Type and fifteen paratypes left after exchange, well preserved except for the inevitable skin-tearing.

ARTHROLEPTIS GUTTEROSUS Chabanaud COTYPE

12836. One. Sanikolé, Liberia. Exch. British Mus. 1927.

BULL. COM. ET HIST. ET SCIENT. A. O. F., 1921, p. 452, pl. 2.
Good condition.

ASPIDONECTES ASPER Agassiz = AMYDA FEROX (Schneider) COTYPES

1597. One. Natchez, Mississippi, U. S. A. Winthrop Sargent.
1622. One. Lake St. John, Mississippi, U. S. A. Winthrop Sargent.

CONTR. NAT. HIST. U. S., **1**, 1857, p. 405.
1597. In large tank; only one of the series of adults kept here alive by Agassiz appears to have been preserved.

ASPIDONECTES EMORYI Agassiz = AMYDA EMORYI (Agassiz) COTYPES

1909–10. Four. Rio Grande, near Brownsville, Texas, U. S. A. Col. Emory. Col. Emory. 1874.
1627. Two. Williamson Co., Texas, U. S. A. G. Stolley. G. Stolley.

CONTR. NAT. HIST. U. S., **1**, 1857, p. 407; **2**, pl. 6, fig. 4–5.
In excellent condition.

ASPIDONECTES NUCHALIS Agassiz = AMYDA SPINIFERA (Lesueur)
COTYPES

1908. One. Tennessee R. (headwaters), U. S. A. I. D. Lindsley.
1623–25. Three. Cumberland R., Tennessee, U. S. A. I. D. Lindsley.

CONTR. NAT. HIST. U. S., **1**, 1857, p. 406.

According to Agassiz's account, it is more probable that 1908 was really collected by Baird, but it is not so recorded in our register. There is some uncertainty as to just which specimens of this supposed species Agassiz had before him, as they were all catalogued some years subsequent to his studies and additional specimens were constantly being received during Agassiz's life. I firmly believe, however, that these four are the actual cotypes.

ATELOPUS ELEGANS (Boulenger). See ATELOPUS GRACILIS Barbour
COTYPES

ATELOPUS GRACILIS Barbour = ATELOPUS ELEGANS (Boulenger)
COTYPES

2423. Seven. Gorgona Id., Bay of Panama. W. W. Brown. J. E. Thayer. 1905.

BULL. MUS. COMP. ZOÖL., **46**, 1905, p. 102.

A fine series perhaps representing an island race but synonymous with the mainland *elegans* according to Mr. Parker of the British Museum.

ATELOPUS SPURRELLI CERTUS Barbour HOLOTYPE AND PARATYPES

8538. One. Mt. Sapo, Eastern Panama Republic. Barbour and Brooks. T. Barbour. 1922.
9216–47. Thirty-two. Mt. Sapo, Eastern Panama Republic. Barbour and Brooks. T. Barbour 1922.

OCC. PAPERS MUS. ZOÖL. UNIV. MICH., **129**, 1923, p. 12.

A well-preserved series.

ATRACTASPIS PHILLIPSI Barbour HOLOTYPE

8782. One. Singa, Sennar Prov., Anglo-Egyptian, Sudan. Allen and Phillips. J. C. Phillips. 1913.

PROC. BIOL. SOC. WASH., **26**, 1913, p. 148.

A young specimen well preserved.

ATRACTUS LATIFRONTALIS (Garman). See GEOPHIS LATIFRONTALIS Garman. HOLOTYPE

ATRACTUS OBTUSIROSTRIS Werner COTYPE

22347. One. Cañon del Tolima, Colombia. Fassl. T. Barbour. 1926.

ZOÖL. ANZ., **47**, 1916, p. 308.

A good specimen.

AULURA ANOMALA Barbour HOLOTYPE AND GENOTYPE

4660. One. Brazil. L. Agassiz et al. Thayer Exped. 1865.

PROC. N. ENG. ZOÖL. CLUB, **4**, 1914, p. 96.
Excellent specimen.

BACHIA INTERMEDIA Noble HOLOTYPE AND PARATYPES

14630. One. Perico, Peru. G. K. Noble. Harvard Peruvian Exped. 1916.
14701–34. Thirty-four. Perico, Peru. G. K. Noble. Harvard Peruvian Exped. 1916.
14735–59. Twenty-five. Bellavista, Peru. G. K. Noble. Harvard Peruvian Exped. 1916.

ANN. N. Y. ACAD. SCI., **29**, 1921, p. 142.
A fine series, many specimens well preserved.

BARBOURULA BUSNANGENSIS Taylor and Noble HOLOTYPE AND GENOTYPE

14004. One. Busnanga Id., Philippine Is. E. H. Taylor. T. Barbour. 1927.

AMER. MUS. NOVIT., **121**, 1924, p. 1, fig. 1.
Good condition.

BAVAYIA CYCLURA MONTANA Roux COTYPE

19634. One. Mt. Igirambi, New Caledonia. Sarasin and Roux. Exch. Basel Nat. Hist. Mus. 1924.

NOVA CALEDONIA, ZOÖL., **1**, 1913, p. 88.
A very fair specimen.

BITIS GABONICA (Duméril and Bibron). See ECHIDNA GABONICA Duméril and Bibron COTYPE

BOA CONSTRICTOR ISTHMICA Garman
= CONSTRICTOR CONSTRICTOR IMPERATOR (Daudin) COTYPES

2097. Two. Bas Obispo, Republic of Panama. G. A. Maack. G. A. Maack. 1871.
2696. One. Turbo, Colombia. G. A. Maack. G. A. Maack. 1871.

MEM. MUS. COMP. ZOÖL., **8**, 1883, p. 9.
In poor condition. Described as "var. *isthmica*."

BOA COOKII GRENADENSIS Barbour HOLOTYPE AND PARATYPE

7790. One. St. George, Grenada, Br. W. I. G. M. Allen. T. Barbour. 1910.

7791. One. St. George, Grenada, Br. W. I. G. M. Allen. T. Barbour. 1910.

MEM. MUS. COMP. ZOÖL., **44**, 1914, p. 327.
Good examples.

BOIGA SCHULTZEI Taylor COTYPE

25791. One. Palawan Id., Philippine Is. W. Schultze. T. Barbour. 1927.

PHIL. JOUR. SCI., **22**, 1923, p. 552, pl. 3, fig. 3.
Excellent condition.

BOTHROPS AMMODYTOIDES (Boulenger). See Rhinocerophis nasus Garman.

BOTHROPS ANDIANA Amaral HOLOTYPE AND PARATYPES

8832. One. Machu, Pichu, Dept. of Cuzco, Peru. G. E. Eaton. Yale-Peruvian Exped. 1916.
8833. One. Machu, Pichu, Dept. of Cuzco, Peru. G. E. Eaton. Yale-Peruvian Exped. 1916.
12415. One. Machu Pichu, Dept. of Cuzco, Peru, 8,000 ft. E. Heller. Yale-Peruvian Exped. 1916.

PROC. N. ENG. ZOÖL. CLUB, **8**, 1923, p. 103.
Fairly well preserved.

BOTHROPS ATROX (Linné). See TRIGONOCEPHALUS ASPER Garman COTYPES

TRIGONOCEPHALUS CARIBBAEUS Garman COTYPES

BOULENGERULA ULUGURUENSIS Barbour and Loveridge HOLOTYPE AND PARATYPES

12367. One. Vituri, Uluguru Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.
9502. One. Mkuyuni, Uluguru Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1924.
12347–50. Four. Bagilo, Uluguru Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.
12351–62. Twelve. Nyange, Uluguru Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.
12363–66, 12368–78. Fourteen. Vituri, Uluguru Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.

12388–91. Four. Madarazi, Uluguru Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.

MEM. MUS. COMP. ZOÖL., **50**, 1928, p. 183.
Excellent condition.

BRACHYMELES BURKSI Taylor PARATYPE

26584. One. Calapan, Mindoro Id., Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **12**, 1927, p. 275, text fig. 6, pl. 1, fig. 5.
Excellent condition.

BRACHYMELES PATHFINDERI Taylor HOLOTYPE AND PARATYPES

26581. One. Glan, Cotobato Province, Mindanao Id., Philippine Is. E. H. Taylor. T. Barbour. 1927.
26582–83. Two. Glan and Tatayan, Cotobato Province, Mindanao Id., Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **26**, 1925, p. 104.
Excellent condition.

BRACHYMELES VERMIS Taylor PARATYPE

26586. One. Sulu Is., Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **13**, 1918, p. 89, text fig. 10.
Excellent condition.

BRACHYMELES WRIGHTI Taylor HOLOTYPE

26589. One. Trinidad Farm School, Trinidad, Benguet Subprovince, northern Luzon, Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **26**, 1925, p. 106.
Excellent condition.

BRACHYOPHIDIUM RHODOGASTER Wall. COTYPES

18070–77. Eight. Shembaganur, Southern India. F. Wall. Col. F. Wall. 1923.

JOUR. BOMBAY NAT. HIST. SOC., **28**, 1921, p. 41, pl.
Excellent condition.

BREVICEPS ADSPERSUS Peters COTYPE

11619. Damaraland, S. W. Africa. Higgins. Exch. Zoöl. Mus. Berlin. 1925.

REISE NACH MOSSAMBIQUE, **3**, 1882, p. 177.
Somewhat soft.

BREVICEPS PARVUS Hewitt COTYPE

10836. One. Grahamtown, Cape Province, S. Africa. Exch. Albany Mus. 1925.

ANN. NAT. MUS., **5**, 1925, p. 192, pl. 10, figs. 6–8.
Excellent condition.

BREVICEPS ULUGURUENSIS Loveridge HOLOTYPE

10442. One. Bagilio, Uluguru Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1925.

PROC. ZOÖL. SOC. LOND., 1925, p. 789, pl. 1, fig. 3.
Excellent specimen but for the parasitized feet which obscure the normally small shovel-shaped inner metatarsal tubercle.

BREVICEPS USAMBARICUS Barbour and Loveridge
HOLOTYPE AND PARATYPES

13711. One. Amani, Usambara Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.
13712–35. Ninety-eight. Amani, Usambara Mts., Tanganyika Territory. A Loveridge. T. Barbour, 1927.
13761–65. Five. Mt. Lutindi, Usambara Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.

MEM. MUS. COMP. ZOÖL., **50**, 1928, p. 251.
Excellent condition.

BROOKESIA STUMPFFII Boettger COTYPES

17641–42. Two. Nossi-bé, Madagascar. C. Ebenau and A. Stumpff. Exch. Senck. Mus. 1883–85.

ZOÖL. ANZ., **17**, 1894, p. 182.
Rather soft and macerated.

BUFO BANKORENSIS Barbour COTYPES

2432. Two. Bankoro, Central Formosa. A. Owston's Collectors. T. Barbour. 1906.

BULL. MUS. COMP. ZOÖL., **51**, 1908, p. 323.
Good large specimens, well preserved.

BUFO CAVATOR Barbour HOLOTYPE

2670. One. Ampenan, Lombok I., Dutch E. I. T. Barbour. T. Barbour. 1907.

PROC. BIOL. SOC. WASH., **24**, 1911, p. 21.
A good but possibly somewhat immature specimen. Dunn (1928) considers it a race of *B. biporcatus* Tschudi.

BUFO CHANCHANENSIS Fowler = BUFO TYPHONIUS (Linné) PARATYPE

3217. Chanchan R., Ecuador. S. N. Rhoads. Exch. Acad. Nat. Sci. Phila. 1913.

PROC. ACAD. NAT. SCI. PHILA., 1913, p. 155, pl. 5, lower fig.
A tiny young specimen.

BUFO COERULEOCELLATUS Fowler
= BUFO HAEMATITICUS Cope PARATYPE

3215. One. Bucay, Ecuador. S. N. Rhoads. Exch. Acad. Nat. Sci. Phila. 1913.

PROC. ACAD. NAT. SCI. PHILA., 1913, p. 154, pl. 5, upper fig.
A very young specimen as was the type also.

BUFO DUNNI Barbour HOLOTYPE AND PARATYPES

11076. ♀. Mina Carlota, near Cumanayagua, Cuba. E. R. Dunn. T. Barbour. 1925.
11077. ♂. Mina Carlota, near Cumanayagua, Cuba. E. R. Dunn. T. Barbour. 1925.
11078–119. Forty-one. Mina Carlota, near Cumanayagua, Cuba. E. R. Dunn. T. Barbour. 1925.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1926, p. 192, pl. 13, figs. 1–2.
A fine fresh series of a beautiful species; also many tadpoles.

BUFO FOWLERI Garman COTYPES

518. Four. Danvers, Mass., U S. A. S. P. Fowler. 1863.

BULL. ESSEX INST., **16**, 1884, p. 42.
Excellent condition.

BUFO FULIGINOSUS Mocquard. See NECTES OBSCURUS Barbour
COTYPES

BUFO GARIEPENSIS Smith. See BUFO GRANTI Boulenger COTYPES

BUFO GRANTI Boulenger = BUFO GARIEPENSIS Smith COTYPES

3223–24. Two. Deelfontein, Cape Colony, S. Africa. C. B. Grant. Exch. British Mus. 1913.

ANN. AND MAG. NAT. HIST. 1903, (7) 12, p. 215, pl. 16.

BUFO HAEMITITICUS Cope. See BUFO COERULEOCELLATUS Fowler
PARATYPE

BUFO HEMIOPHRYS Cope — COTYPE

3728. One. Pembina and Turtle Mts., N. Dakota, U. S. A. E. Coues. Exch. U. S. Nat. Mus. 1915.

PROC. AMER. PHIL. SOC., 1887, p. 515.
An old soft specimen.

BUFO MCGREGORI Taylor — PARATYPES

14532–38. Seven. Pasananka, Zamboanga, Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **21**, 1922, p. 182, pl. 4, figs. 2 and 3.
Excellent condition.

BUFO MICRANOTIS Loveridge — HOLOTYPE AND PARATYPE

10333. ♀. Kilosa, Tanganyika Territory. A. Loveridge. T. Barbour. 1925.

10334. ♂. Kilosa, Tanganyika Territory. A. Loveridge. T. Barbour. 1925.

PROC. ZOÖL. SOC. LOND., 1925, p. 770, pl. 1, fig. 1.
Fine fresh specimens. Taken in embrace.

BUFO PARVUS Boulenger — COTYPES

2208. Three. Malacca, within 50 miles of Straits Settlements. F. A. Hervey. Exch. British Mus. 1888.

ANN. MAG. NAT. HIST., (5), **19**, 1887, p. 346, pl. 10, fig. 3.

BUFO PREUSSI Matschie — COTYPE

10296. Buea, Cameroon. Preuss. Exch. Zoöl. Mus. Berlin. 1925.

SITZBER. GES. NATURF. FREUNDE BERLIN, 1893, p. 175.
A useful specimen.

BUFO RADDEI Strauch — COTYPE

1958. One. Ordos Desert, Russia. G. F. R. Radde. Exch. St. Petersburg. Mus. through A. Strauch.

VOY. PRZEWALSKI, REPT. AND BATR., 1876, p. 53.
A good, well-grown example.

BUFO RAMSDENI Barbour — HOLOTYPE

3213. One. Los Hondones, Mt. Libano, Guantanamo, Cuba. C. T. Ramsden. C. T. Ramsden. 1913.

MEM. MUS. COMP. ZOÖL., **44**, 1914, p. 240.
A perfect gem, a most exquisite little toad.

BUFO RUFUS Garman COTYPES

367–68. Two. Goyaz, Brazil. George Sceva. George Sceva.

PROC. BOSTON SOC. NAT. HIST., **18**, 1876, p. 413.
Rather discolored and somewhat soft.

BUFO TURPIS Barbour HOLOTYPE

4099. One. Virgin Gorda, Br. W. I. J. L. Peters. Museum Exped. 1917.

PROC. BIOL. SOC. WASH., **30**, 1917, p. 102.
A fine example.

BUFO TYPHONIUS (Linné). See BUFO CHANCHANENSIS Fowler PARATYPE

BUNOPUS TUBERCULATUS Blanford
= ALSOPHYLAX TUBERCULATUS (Blanford) COTYPE

7128. One. Baluchistan. W. T. Blanford. Exch. Indian Mus. 1908.

ANN. MAG. NAT. HIST., (4) **13**, 1874, p. 454.
Bleached but well preserved.

CACOPOIDES BOREALIS Barbour
= KALOULA BOREALIS (Barbour) HOLOTYPE AND GENOTYPE

2436. One. Antung, Manchuria. A. Owston's Collectors. T. Barbour. 1906.

BULL. MUS. COMP. ZOÖL., **51**, 1908, p. 321.
Type in fair condition.
On a visit to London Boulenger persuaded me that this genus and species was identical with his "*Callula*" *verrucosa*. I mailed a note from Brazil to the Biological Society of Washington (Proc. **22**, 1909, p. 87), noting the identity, as Boulenger advised. When I returned and made a new and detailed study of my type, I found that Boulenger was wholly wrong and that I had been most premature in taking his advice. I re-established the genus and species in Proc. Acad. Nat. Sci. Phila., 1909, p. 401. Superficially the two species are extraordinarily alike. The most recent information is that the species is distinct but that the genus is identical with Kaloula. [T. B.]

CADEA PALIROSTRATA Dickerson PARATYPE

12052. One. San Pedro, Isla de Pinos, Cuba. C. S. Mead. Exch. Amer. Mus. Nat. Hist. 1916.

BULL. AMER. MUS. NAT. HIST., **35**, 1916, p. 659.
An excellent example of a most remarkable form. This is an abundant species in the Island of Pines, as our recent collecting proves. The very different *Cadea blanoides* of Western Cuba seems to be rare everywhere.

CAECILIA SABOGAE Barbour
= HERPELE OCHROCEPHALA (Cope) COTYPES

2425. Two. Saboga Id., Bay of Panama. W. W. Brown. J. E. Thayer. 1905.

BULL. MUS. COMP. ZOÖL., **46**, 1906, p. 228.
The specimens are somewhat shrunken.

CAINODACTYLUS YUNNANENSIS (Boulenger) Barbour GENOTYPE

18967. One. Yunnan-fu, China. J. Graham. T. Barbour. 1924.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1924, p. 133, fig. 1.
The species, formerly known as *Gehyra yunnanensis* Boulenger, was found to be generically distinct from Gehyra upon studying this specimen.

CALAMARIA ALBOPUNCTATA Barbour HOLOTYPE

7106. One. ?, East Indies. ? and Johnson. Mr. Johnson. 1897.

BULL. MUS. COMP. ZOÖL., **51**, 1908, p. 319.
A poor old specimen albeit apparently distinct.

CALAMARIA APRAEOCULARIS Malcolm Smith. PARATYPE

25265. One. Djikoro, Mt. Bonthain, S. Celebes. Malcolm Smith. T. Barbour. 1927.

PROC. ZOÖL. SOC. LOND., 1927, p. 224.
Excellent condition.

CALAMARIA BOGORENSIS Lidth de Jeude
= CALAMARIA VIRGULATA Boie COTYPE

20970. One. Buitenzorg, Java. M. Weber. Exch. Zoöl. Mus. Amsterdam. 1925.

M. WEBER: ZOÖL. ERGEBN., **1**, 1890, p. 182.
A good example.

CALAMARIA EGREGIA Barbour HOLOTYPE

22648. One. Mt. Tibang, North-central Dutch Borneo. E. Mjøberg. T. Barbour. 1926.

PROC. BIOL. SOC. WASH., **40**, 1927, p. 127.
Good condition.

CALAMARIA ELECTA Barbour HOLOTYPE

22650. One. Pasir, Southeast Dutch Borneo. E. Mjøberg. T. Barbour. 1926.

PROC. BIOL. SOC. WASH., **40**, 1927, p. 128.
Good condition.

CALAMARIA SONDAICA Barbour HOLOTYPE

7102. One. Buitenzorg, Java. T. Barbour. T. Barbour. 1906.

BULL. MUS. COMP. ZOÖL., **51**, 1908, p. 319.

A fine specimen of an apparently valid species. The genus, however, is in great need of revision, as the species have been greatly multiplied recently and the types are scattered widely.

CALAMARIA VIRGULATA Boie. See CALAMARIA BOGORENSIS Lidth de Jeude COTYPE

CALLIGLUTUS SMITHI Barbour and Noble
HOLOTYPE AND PARATYPE OF GENUS AND SPECIES

3797. One. Limbang, R. Dist. of N. Sarawak. H. W. Smith. H. W. Smith. 1915.

3798. One. Limbang, R. Dist. of N. Sarawak. H. W. Smith. H. W. Smith. 1915.

PROC. N. ENG. ZOÖL. CLUB, **6**, 1916, p. 20, pl. 2, figs. 1–2.

A gorgeously decorated frog; the types are beautifully preserved.

CALLISAURUS INUSITATUS Dickerson = CALLISAURUS VENTRALIS INUSITATUS (Dickerson) PARATYPE

14321. One. Guaymas, Mexico. W. W. Brown. J. E. Thayer. ?1908.

BULL. AMER. MUS. NAT. HIST., **41**, 1919, p. 466.

Well preserved.

CALLISAURUS VENTRALIS INUSITATUS (Dickerson). See CALLISAURUS INUSITATUS Dickerson PARATYPE

CALLULA NATATRIX Cope
= MICROHYLA BERDMOREI Blyth COTYPES

1587. Five. Rangoon, Burma. W. Theobald, Jr. W. Theobald, Jr.

JOUR. ACAD. NAT. SCI. PHILA., (2), **6**, 1867, p. 192.

Soft and much macerated.

CALLULA VERRUCOSA Boulenger
= KALOULA VERRUCOSA (Boulenger) COTYPES

2476. Two. Yunnan-fu, China. John Graham. Exch. British Mus. 1908.

ANN. MAG. NAT. HIST., (7), **8**, 1904, p. 131.

Good specimens.

CALOTES ELLIOTII Günther COTYPES

6207. Four. Anamallay Hills, India, 4,700 ft. Exch. British Mus. 1888.

REPT. BRIT. INDIA, 1864, p. 142.

The evidence is not absolutely clear that these "types" were actually before Günther when he described the species, but large collections bearing the same data were in his hands.

CARDIOGLOSSA DECORATA Barbour and Loveridge HOLOTYPE AND PARATYPES

12032. One. Bangah, Liberia. G. M. Allen. Harvard Liberian Exped. 1926.

12027–31. Five. Gbanga, Liberia. G. M. Allen. Harvard Liberian Exped. 1926.

PROC. N. ENG. ZOÖL. CLUB, **10**, 1927, p. 15.

Excellent condition.

CARDIOGLOSSA LIBERIENSIS Barbour and Loveridge HOLOTYPE

12034. One. Péahtah, St. Paul's River, Liberia. G. M. Allen. Harvard Liberian Exped. 1926.

PROC. N. ENG. ZOÖL. CLUB, **10**, 1927, p. 16.

Excellent condition.

CARETTA KEMPII (Garman). See THALASSOCHELYS (COLPOCHELYS) KEMPII Garman COTYPE

CELESTUS COSTATUS (Cope). See CELESTUS PHOXINUS Cope HOLOTYPE

DIPLOGLOSSUS STENURUS Cope HOLOTYPE

PANOLOPUS COSTATUS Cope HOLOTYPE

CELESTUS HANCOCKI Slevin PARATYPE

27119. One. Malpelo Id., 250 miles off coast of Colombia. J. R. Slevin. Exch. Calif. Acad. Sci. 1928.

PROC. CAL. ACAD. SCI., **16**, 1928, p. 682, pl. 26.

Excellent condition.

CELESTUS MACULATUS (Garman). See DIPLOGLOSSUS MACULATUS Garman HOLOTYPE

CELESTUS OCCIDUUS (Shaw). See DIPLOGLOSSUS CRUSCULUS Garman. HOLOTYPE

CELESTUS PHOXINUS Cope = CELESTUS COSTATUS (Cope) HOLOTYPE

12457. One. Jeremie, Haiti. D. F. Weinland. Purchased. 1859.

PROC. ACAD. NAT. SCI. PHILA., 1868, p. 125.

One of the specimens recovered from Philadelphia many years after Cope's death.

CENTROPYX COPII Garman COTYPES

6076. Three. Bridgetown, Barbadoes, Br. W. I. S. Garman. Blake Exped. 1879.

BULL. ESSEX INST., **19**, 1887, p. 2.

Well-preserved examples of this species, which is now apparently absolutely extinct.

CENTROTELMA CRYPTOMELAN Cope
= HYLA CRYPTOMELAN (Cope) HOLOTYPE

1530. One. Bahia, Brazil. Antonio de Lacerda. Thayer Exped. 1864–65.

JOUR. ACAD. NAT. SCI. PHILA., (2), **6**, 1867, p. 204.

A dried and shrunken specimen but with the coloration showing well.

CERATOBATRACHUS GUENTHERI Boulenger COTYPE

2207. Two. Faro Id., Solomon Is. Mr. Guppy. Exch. British Mus. 1888.

PROC. ZOÖL. SOC. LOND., 1884, p. 212.

Two good specimens of this curious but common frog.

CERATOPHRYS INTERMEDIA Barbour HOLOTYPE

2254. One. Sta. Catharina, Brazil. Aug. Müller coll. Purchased from Naturh. Inst. Linnaea. 1890.

BULL. MUS. COMP. ZOÖL., **51**, 1908, p. 323.

A fine example. This is apparently the species recently redescribed by Dr. Alipio de Miranda Ribiero as *Ceratophrys renalis*.

CERASTES AEGYPTIACUS Duméril and Bibron
= CERASTES CORNUTUS (Forskal) COTYPE

1960. One. Egypt. Exch. Paris Mus. through A. A. Duméril. 1864.

ERP. GÉN., **7**, p. 1440, pl. 78b., fig. 3.

Faded and somewhat scaled.

CERASTES CORNUTUS (Forskal). See CERASTES AEGYPTIACUS Duméril and Bibron COTYPE

CHAMAELEO ANGUSTICORONATUS Barbour HOLOTYPE

6712. One. Zanzibar. E. D. Roper. J. M. Barnard. 1903.

PROC. BIOL. SOC. WASH., **16**, 1903, p. 61.

A good specimen. Schmidt, Loveridge, and others who have examined the specimen admit its distinctness but join in believing it strange that no subsequent specimens have appeared. In 1923 collections were made on Zanzibar by Mr. Loveridge's trained native assistants, but no chamaeleons were secured. There were many examples of *C. dilepis* from Zanzibar in the old Salem collection made by the sea captains and now in this Museum.

CHAMAELEO BASILISCUS Cope HOLOTYPE

5766. One. Korosko, Egypt. H. H. Ward. Peabody Mus. Salem. 1886.

PROC. ACAD. NAT. SCI. PHILA., 1868, p. 316.

The specimen purchased by the Salem Museum from Professor Ward served Cope as his type. It was No. 489 of an earlier catalogue. The other specimens having the same history and at the same time purchased by this Museum are not, however, cotypes.

CHAMAELEO(N) BOETTGERI Boulenger. See CHAMAELEO MACRORHINUS Barbour HOLOTYPE

CHAMAELEO ETIENNEI Schmidt PARATYPES

13340–41. ♂ ♀. Banana, Belgian Congo. Lang-Chapin Exped. Exch. Amer. Mus. Nat. Hist. 1919.

BULL. AMER. MUS. NAT. HIST., **39**, 1919, p. 574.

Two fine specimens.

CHAMAELEO FISCHERI EXCUBITOR (Barbour). See CHAMAELEO TENUIS EXCUBITOR Barbour HOLOTYPE

CHAMAELEO(N) FISCHERI MATSCHIE Werner. See CHAMAELEO(N) FISCHERI VOSSELERI Nieden. COTYPE

CHAMAELEO(N) FISCHERI VOSSELERI Nieden
= CHAMAELEO(N) FISCHERI MATSCHIE Werner COTYPE

20194. One. Tanga, Tanganyika Territory. Reimer. Exch. Zoöl. Mus. Berlin. 1925.

SITZBER. GES. NATURF. FREUNDE BERLIN, 1913, p. 247.

A good example.

CHAMAELEO(N) FISCHERI WERNERI Nieden COTYPE
= CHAMAELEO(N) FISCHERI MULTITUBERCULATUS Nieden

20195. One. Mlalo, bei Wilhelmstal, W. Usambara Mts., Tanganyika Territory. Röhl. Exch. Zoöl. Mus. Berlin. 1925.

SITZBER. GES. NATURF. FREUNDE BERLIN, 1913, p. 247.

Another useful specimen. The "bei Wilhelmstal" may have been added since in error for apparently Mlalo near Ambangula was intended. Though *werneri* has page precedence over *multituberculatus*, the former is preoccupied by *C. werneri* Tornier.

CHAMAELEO(N) GRAUERI Steindachner
= CHAMAELEO JOHNSTONII Boulenger PARATYPE

18027. One. Northwest of Lake Tanganyika. Grauer. T. Barbour. 1924.

ANZ. AKAD. WISS. WIEN., 1911, p. 177.

Good condition.

CHAMAELEO ITURIENSIS Schmidt PARATYPES
= CHAMAELEO JOHNSTONII Boulenger

13357–58. Two. Medje, Belgian Congo. Lang-Chapin Exped. Exch. Amer. Mus. Nat. Hist. 1919.

BULL. AMER. MUS. NAT. HIST., **39**, 1919, p. 589, pl. 31, fig. 2, pl. 32, figs. 1–5.

Immature examples which do not show the characters of *C. johnstonii*.

CHAMAELEO(N) JOHNSTONII Boulenger COTYPE

7257. One. Mt. Ruwenzori, Uganda. Sir Harry Johnston. T. Barbour.

PROC. ZOÖL. SOC. LOND., 1901, **2**, p. 135, pl. 12, 13.

Good condition.

CHAMAELEO JOHNSTONII Boulenger. See CHAMAELEO(N) GRAUERI Steindachner PARATYPE

CHAMAELEO ITURIENSIS Schmidt PARATYPES

CHAMAELEO MACRORHINUS Barbour
= CHAMAELEO(N) BOETTGERI Boulenger HOLOTYPE

5988. One. Madagascar. Aug. Müller coll. Purchased from Naturh. Inst. Linnaea. 1887.

PROC. BIOL. SOC. WASH., **16**, 1903, p. 62.

A pretty little species.

CHAMAELEO TENUIS EXCUBITOR Barbour HOLOTYPE
= CHAMAELEO FISCHERI EXCUBITOR Barbour

7826. ♂. Mweru Dist., Kenya Colony. W. R. Zappey. C. Frick, Esq. 1910.

PROC. BIOL. SOC. WASH., **24**, 1911, p. 219.

Material is as yet too scanty to make certain whether this race will really stand as valid. A male, not a female as at first supposed.

CHAMAELEO WIEDERSHEIMI Nieden COTYPE

20198. One. Banjo Mts., Cameroon. Riggenbach. Exch. Berlin Mus. 1925.

ARCHIV. NATURG., **76**, 1911, p. 239.

A fine example.

CHAMAESAURA MACROLEPIS (Cope). See MANCUS MACROLEPIS Cope COTYPE

CHAPERINA BEYERI Taylor PARATYPES
= SPHENOPHRYNE FUSCA (Mocquard)

10469–72. Four. Bunawan, Agusan Prov., Philippine Is. E. H. Taylor. Exch. Carnegie Mus. 1925.

14561–62. Two. Edge of Davao Prov., Mindanao, P. I. E. H. Taylor. T. Barbour. 1928.

14563. One. Cran Point, Cotobato, P. I. E. H. Taylor. T. Barbour. 1928.

14564. One. Thumb Peak, Palawan Id., P. I. E. H. Taylor. T. Barbour. 1928.

PHIL. JOUR. SCI., **16**, 1920, p. 333, pl. 3, fig. 3.

Well-preserved specimens.

CHELONIA DEPRESSA Garman COTYPES

4473. One. North Australia

This is a mounted specimen on exhibition in the reptile room.

1413. One. Penang, East Indies. W. H. Putnam. L. Agassiz. 1857.

BULL. MUS. COMP. ZOÖL., **6**, 1880, p. 124.

The large mounted specimen now on exhibition in the museum represents this most distinct species, which has recently been well redescribed by Foy (Rec. Austr. Mus., **10**, 1913, p. 159–185, pls. 19–22). The cotype 1413 is a young Pacific Green Turtle, *Chelonia japonica* (Thunberg).

CHELONIA JAPONICA (Thunberg). See CHELONIA DEPRESSA Garman part. COTYPES

CHRYSEMYS BELLII DORSALIS (Agassiz). See CHRYSEMYS DORSALIS Agassiz COTYPES

CHRYSEMYS BELLII MARGINATA (Agassiz). See CHRYSEMYS MARGINATA Agassiz COTYPES

CHRYSEMYS DORSALIS Agassiz COTYPES
= CHRYSEMYS BELLII DORSALIS (Agassiz)

1801. ♀. Lake Concordia, Louisiana, U. S. A. Prof. Wailes. Prof. Wailes.
1802. ♂. Market at Natchez, Mississippi, U. S. A. W. Sargent. W. Sargent.

CONTR. NAT. HIST., U. S., **1**, 1857, p. 440.
This pair, ♂ and ♀, were apparently the only specimens Agassiz had.

CHRYSEMYS MARGINATA Agassiz COTYPES
= CHRYSEMYS BELLII MARGINATA (Agassiz)

1780. Three. Delphi, Indiana, U. S. A. F. Hill. F. Hill.
1791. Three. Ann Arbor, Michigan, U. S. A. A. Winchell. A. Winchell.
1796. Nine. Flint, Michigan, U. S. A. M. Miles. M. Miles.
1789–90. Three. Milwaukee, Wisconsin, U. S. A. J. A. Lapham. J. A. Lapham.

CONTR. NAT. HIST. U. S., **1**, 1857, p. 439; **2**, pl. 1, fig. 6, pl. 5, figs. 1–4.
All well preserved but the majority immature specimens. One of the Ann Arbor specimens now in the Museum of Zoölogy, University of Michigan.

CISTUDO MAJOR Agassiz = TERRAPENE MAJOR (Agassiz) COTYPES

1505–08. Four. Florida, U. S. A. T. Lyman and N. C. Robbins.
1509–10. Two. Mobile, Alabama, U. S. A. Dr. Nott.

CONTR. NAT. HIST. U. S., **1**, 1857, p. 445.
Fairly well preserved, some horny plates slipping.

CISTUDO ORNATA Agassiz = TERRAPENE ORNATA (Agassiz) COTYPE

1536 One. Burlington, Iowa, U. S. A. J. Rauch.

CONTR. NAT. HIST. U. S., **1**, 1857, p. 445, pl. 3, figs. 12–13.
The other cotypes are in the U. S. National Museum.

CISTUDO TRIUNGUIS Agassiz COTYPES
= TERRAPENE CAROLINA TRIUNGUIS (Agassiz)

1519–25. Seven. New Orleans, Louisiana, U. S. A. Dr. Benedict and T. C. Copes.

CONTR. NAT. HIST. U. S., **1**, 1857, p. 445.
A good series, well preserved.

CISTUDO VIRGINEA Agassiz COTYPES
= TERRAPENE CAROLINA (Linné)

1526–33. Eight. Gouldsboro, N. C., U. S. A. W. C. Kerr.
1534–55. Two. Beaufort, N. C., U. S. A. R. Barnwell, Jr.
1537. One. Ann Arbor, Michigan, U. S. A. A. Winchell.
1539. One. New Jersey, U. S. A. A. Mayor.
1542. One. Massachusetts, U. S. A.
1543–44. Two. Lancaster, Mass., U. S. A. Mr. Whittaker.
1545–50. Six. Springfield, Mass., U. S. A. J. A. Allen.
1552–53. Two. North Carolina, U. S. A. W. C. Kerr.
1554. One. Delaware River, U. S. A.
1555. Two. Maryland near Washington, U. S. A. S. F. Baird.
1557. Two. Tennessee, U. S. A.

CONTR. NAT. HIST. U. S., **1**, 1857, p. 445.
A fine series, though some are faded and with horny scutes slipped.

CLEMMYS MUHLENBERGI (Schoepff). See CLEMMYS NUCHALIS Dunn. PARATYPE

CLEMMYS NUCHALIS Dunn PARATYPE
= CLEMMYS MUHLENBERGI (Schoepff)

12498. One. Brevard, N. Carolina, U. S. A. E. R. Dunn. Exch. Amer. Mus. Nat. Hist. 1916.

BULL. AMER. MUS. NAT. HIST., **37**, 1917, p. 624, pl. 61, text figs. 6–7.

CNEMIDOPHORUS LENTIGINOSUS Garman COTYPES
= DICRODON LENTIGINOSUS LENTIGINOSUS (Garman)

10775–76. Two. San Francisco de Posorja, near Guayaquil, Ecuador. G. Bauer. Exch. Univ. Chicago. 1909.

BULL. ESSEX INST., **24**, 1892, p. 92.
This is the species which was also described as *Ameiva leucostigma* by Boulenger. It is not an Ameiva. The specimens are well preserved.

CNEMIDOPHORUS LEMNISCATUS RUATANUS Barbour HOLOTYPE

26759. One. Ruatan Id., Bay Is., Honduras. T. Barbour. T. Barbour. 1928.

PROC. N. ENG. ZOÖL. CLUB, **10**, 1927, p. 60.
Excellent condition.

CNEMIDOPHORUS MELANOSTETHUS Cope. See CNEMIDOPHORUS PUNCTILINEALIS Dickerson PARATYPE

CNEMIDOPHORUS PUNCTILINEALIS Dickerson PARATYPE
= CNEMIDOPHORUS MELANOSTETHUS Cope

14305. One. San José de Guaymas, Mexico. W. W. Brown, Jr. J. E. Thayer. ?1919.

BULL. AMER. MUS. NAT. HIST., **41**, 1919, p. 475.
In good preservation.

COECILIA SABOGAE Barbour COTYPES
= HERPELE OCHROCEPHALA (Cope)

2425. Two. Saboga Id., Islas de las Perlas, Bay of Panama. W. W. Brown. J. E. Thayer. 1905.

BULL. MUS. COMP. ZOÖL., **46**, 1906, p. 228.
Apparently common also on the mainland about Panama City.

COLOPHRYS RHODOGASTER Cope COTYPES
= GEOPHIS RHODOGASTER (Cope)

5828. Three. Guatemala City. ?Van Patten.

PROC. ACAD. NAT. SCI. PHILA., 1868, p. 130, fig.
In fair preservation.

CONIOPHANES SIGNATUS Garman

Guayaquil, Ecuador.

BULL. ESSEX INST., **24**, 1892, p. 91.
Type not in Baur Collection received from Clark University, Worcester, and apparently not now to be found at Chicago University either.

CONSTRICTOR CONSTRICTOR IMPERATOR (Daudin). See BOA CONSTRICTOR ISTHMICA Garman COTYPES

CONSTRICTOR CONSTRICTOR SABOGAE (Barbour). See EPICRATES SABOGAE Barbour COTYPES

CORNUFER BEAUFORTI Van Kampen COTYPE
= RANA BEAUFORTI (Van Kampen)

10774. One. Majalibit Bay, Waigiu. L. F. de Beaufort. Exch. Zoöl. Mus. Amsterdam. 1925.

BIJDR. T. D. DIERK., 1913, pt. 19, p. 91.
This frog was subsequently referred to as *Platymantis beauforti* by Boulenger (1918) and later transferred to *Rana* by Van Kampen when he figured it (fig. 24, p. 189) in "The Amphibia of the Indo-Australian region." Leyden, 1923.

CORNUFER CORRUGATUS RUBRISTRIATUS Barbour COTYPES
= CORNUFER RUGATA RUBRISTRIATA (Barbour)

2441. Two. Roon Id., Geelvink Bay, Dutch New Guinea. T. Barbour. T. Barbour. 1907.

PROC. BIOL. SOC. WASH., **21**, 1908, p. 190.

Slightly harder than they should be. The types are well preserved and bear no special similarity to *C. solomonis*. Van Kampen (Amph. Indo-Austr. Archip. Leyden, 1923, p. 191) believes that "perhaps" the two forms may be identical.

CORNUFER RIVULARIS Taylor PARATYPE

14386. One. Balbalan, Kalinga subprovince, northern Luzon, Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHILIPPINE JOUR. SCI., **21**, 1922, p. 270.

Excellent condition.

CORNUFER RUGATA RUBRISTRIATA (Barbour). See CORNUFER CORRUGATUS RUBRISTRIATUS Barbour COTYPES

CRASPEDOGLOSSA SANTAE-CATHARINAE Müller COTYPES

8923–25, 11675–77. Six. Rio Humboldt, Santa Catharina, Brazil. Purchased from Karl Fritsche. T. Barbour. 1918 and 1925.

BLÄTTER F. AQUARIEN U. TERRARIENKUNDE, **33**, 1922, p. 168.

A nice suite. No. 11677 consists of eggs.

CRINIA STICTIVENTRIS Cope

672. Two. Australia.

JOUR. ACAD. NAT. SCI. PHILA., **6**, 1867, p. 202.

Cope says that the ♂ and ♀ are in the Museum of Comparative Zoölogy. They are not to be found at present. The numbers refer to the old catalogue which has long since disappeared, although other specimens, which were once entered therein, have been identified. These specimens are possibly in the collection under another name but they have not been located in spite of an ardent search. (Are they in the Philadelphia Academy?)

CROTALUS EXSUL Garman COTYPES

652. Two. Cedros Id., Lower California, Mexico. A. Agassiz. 1862.

MEM. MUS. COMP. ZOÖL., **8**, 1883, p. 114.

One young specimen entire, and one head and neck in good preservation.

CROTALUS PALMERI Garman HOLOTYPE
= CROTALUS LEPIDUS (Kennicott)

4578. One. Monclova, Mexico. E. Palmer. Purchased. 1880.

BULL. ESSEX INST., **19**, 1887, p. 6.
An alcoholic skin.

CROTALUS PULVIS Ditmars HOLOTYPE
= CROTALUS TERRIFICUS (Laurenti)

7044. One. Nicaragua (20 miles inland from Managua). R. Schilling. New York Zoöl. Soc. 1906.

NINTH ANN. REP. N. Y. ZOÖL. SOC. for 1904 (1905) p. 199, fig.
A beautiful specimen but based upon an albino; similar specimens found in Brazil have been reported by Amaral.

CROTALUS TERRIFICUS (Laurenti). See CROTALUS PULVIS Ditmars. HOLOTYPE

CROTALUS TORTUGENSIS Van Denburgh and Slevin PARATYPES

16781. One. Tortuga Id., Lower California. J. R. Slevin. Exch. Calif. Acad. Sci. 1922.

PROC. CALIF. ACAD. SCI., (4), **11**, 1921, p. 398.
A beautiful specimen of this rather ill-defined form.

CROTAPHOPELTIS ELONGATA Barbour
= DIPSADOBOA ELONGATA (Barbour) HOLOTYPE

9260. One. Lolodorf, Cameroon. George Schwab. Purchased. 1913.

PROC. N. ENG. ZOÖL. CLUB, **4**, 1914, p. 95.
A fine example.

CRYPTOBATRACHUS BOULENGERI Ruthven
= CRYPTOBATRACHUS FUHRMANNI (Peters) PARATYPE

4092. One. Cincinnati Plantation, Sta. Marta, Colombia. M. A. Carriker. Exch. Univ. Mich. Mus. 1917.

OCC. PAPERS MUS. ZOÖL. UNIV. MICH., **33**, 1916, p. 2, pl. 1.
A young specimen.

CRYPTOBATRACHUS FUHRMANNI (Peters). See CRYPTOBATRACHUS BOULENGERI Ruthven. PARATYPE

CRYPTOBATRACHUS INCERTUS Barbour HOLOTYPE

11616. One. Sonsón (2,545 meters). Dept. Antioquia, Colombia. H^no. Nicéforo Maria. T. Barbour. 1925.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1926, p. 193.
A well-preserved adult.

CRYPTOBLEPHARUS BOUTONII ATRA (Boettger). See ABLEPHARUS BOUTONI ATRA Boettger — COTYPES

CRYPTOBLEPHARUS BOUTONII BALINENSIS Barbour — HOLOTYPE

7480. One. Buleleng, Bali Id., Dutch East Indies. T. Barbour. T. Barbour. 1906.

PROC. BIOL. SOC. WASH., **24**, 1911, p. 18.
A nice example.

CRYPTOBLEPHARUS BOUTONII BURDENI Dunn — PARATYPES

27060–63. Four. Padar Id., Dutch East Indies. Burden-Dunn Exped. T. Barbour. 1928.

AMER. MUS. NOVIT., No. 288, 1927, p. 11.
Good condition.

CRYPTOBLEPHARUS BOUTONII CURSOR Barbour — HOLOTYPE

7479. One. Ampenan, Lombok Id., Dutch East Indies. T. Barbour. T. Barbour. 1910.

PROC. BIOL. SOC. WASH., **24**, 1911, p. 18.
This and the lizard from Bali represent beautifully distinct races.

CRYPTOBLEPHARUS BOUTONII HETERURUS (Garman). See ABLEPHARUS HETERURUS Garman. — COTYPES

CRYPTOBLEPHARUS BOUTONII PASCHALIS (Garman) — COTYPES
See CRYPTOBLEPHARUS POECILOPLEURUS var. PASCHALIS Garman

CRYPTOBLEPHARUS BOUTONII VIRGATUS (Garman). See ABLEPHARUS VIRGATUS Garman — HOLOTYPE

CRYPTOBLEPHARUS HETEROPUS (Garman). See ABLEPHARUS HETEROPUS Garman — HOLOTYPE

CRYPTOBLEPHARUS LINEOCELLATUS (Gray). See PANASPIS AENEUS Cope. — COTYPES

CRYPTOBLEPHARUS POECILOPLEURUS var. PASCHALIS Garman. See CRYPTOBLEPHARUS BOUTONII PASCHALIS (Garman)

6695–7003. Eight. Easter Island. A. Agassiz. Eastern Pacific Exped. 1905.

BULL. MUS. COMP. ZOÖL., **52**, 1908, p. 13.
A fine series of another race of this almost tropicopolitan species.

CTENOSAURA ACANTHURA (Shaw). See CTENOSAURA CYCLINOIDES Weigmann and CTENOSAURA DENTICULATA Weigmann COTYPE

CTENOSAURA CLARKI Bailey HOLOTYPE

22454. One. Ovopeo, Michoacan, Mexico. H. Gadow. Exch. British Mus. 1926.

PROC. U. S. NAT. MUS., **73**, 1928, p. 44, pl. 27.
Good condition.

CTENOSAURA COMPLETA Bocourt COTYPE
= CTENOSAURA SIMILIS (Gray)

22662. One. Mexico. Duméril and Bocourt. Exch. Paris. Mus. 1927.

MISS. SCI. MEX., **3**, 1874, p. 145.
Good condition.

CTENOSAURA CYCLINOIDES (Weigmann) and CTENOSAURA DENTICULATA (Weigmann) = CTENOSAURA ACANTHURA (Shaw) COTYPE

22453. One. Mexico. Deppé. Exch. Zoöl. Mus. Berlin. 1926.

IN OKEN'S ISIS, **21**, p. 371. (*C. cycluroides*).
HERP. MEX., p. 42. (*C. denticulata*).

This one-third grown and well-preserved iguana is one of the three original types on which Weigmann founded both *C. cycluroides* and *C. denticulata*. Bailey in his "Revision of the genus Ctenosaura." (Proc. U. S. Nat. Mus., **73**, 1928, p. 14) gives its number as 2253, the "4" evidently having dropped out in its passage through the press as it is correctly cited as 22453 on p. 11.

CYCLOCORUS NUCHALIS Taylor PARATYPE

25676. One. Abung Abung, Basilan Id., Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **22**, 1923, p. 543, pl. 3, figs. 1 and 2.
Excellent condition.

CYCLODERMA FRENATUM Peters COTYPE

21901. One. Zambesi, S. Africa. W. Peters. Exch. Berlin Zoöl. Mus. 1925.

MONATSBER. AKAD. WISS. BERLIN, 1854, p. 216.
A fine large specimen.

CYCLORHAMPHUS ASPER Werner. See ILIODISCUS SEMIPALMATUS Mirando Ribeiro PARATYPE

CYCLORHAMPHUS CULEUS Garman COTYPES
= TELMATOBIUS CULEUS (Garman)

1077. One. Achegache, Bolivia. S. Garman. A. Agassiz. 1875.

1078. One. Molio, Peru. S. Garman. A. Agassiz. 1875.
1079. Five. Desaguadero Gulf, Bolivia. S. Garman. A. Agassiz. 1875.
1080. Three. Carapata, Bolivia. S. Garman. A. Agassiz. 1875.
1088. Three. Puno, Peru. S. Garman. A. Agassiz. 1875.
1091. One. Puno, Peru. S. Garman. A. Agassiz. 1875.
1810–12. Six. Puno, Peru. S. Garman. A. Agassiz. 1875.

BULL. MUS. COMP. ZOÖL., **3**, 1875, p. 276.

A fine set dredged in Lake Titicaca by Mr. Agassiz, using the old steamer *Yavari*, still afloat, for this first hydrographic survey of the lake. Only a few of this series are adult, and some have been exchanged.

CYCLORHAMPHUS FULIGINOSUS (Tschudi). See GRYPISCUS UMBRINUS Cope — HOLOTYPE

CYCLURA CAYMENENSIS Barbour and Noble — HOLOTYPE

10534. Skin. Cayman Id., Br. W. I. W. W. Brown. Museum Exped. 1911.

BULL. MUS. COMP. ZOÖL., **60**, 1916, p. 148.

An alcoholic skin in good condition.

CYCLURA FIGGINSI Barbour — HOLOTYPE AND PARATYPE

17745. Skin. Bitter Guana Cay, Bahamas, Br. W. I. A. M. Bailey. Colo. Nat. Hist. Mus., Denver. 1923.
22391. Skin. Bitter Guana Cay, Bahamas, Br. W. I. A. M. Bailey. Colo. Nat. Hist. Mus., Denver. 1923.

PROC. N. ENG. ZOÖL. CLUB, **8**, 1923, p. 108, pl. 1–2.

Salted skins, now in alcohol.

CYCLURA INORNATA Barbour and Noble — HOLOTYPE

11062. One. Allen's Harbor, U Cay, Bahamas, Br. W. I. C. J. Maynard. T. Barbour. 1915.

BULL. MUS. COMP. ZOÖL., **60**, 1916, p. 151, pl. 14.

A good alcoholic skin.

CYCLURA NIGERRIMA Cope. See CYCLURA ONCHIOPSIS Cope — COTYPE

CYCLURA ONCHIOPSIS Cope = CYCLURA NIGERRIMA Cope — COTYPE

4717. One. Navassa Id., W. I. (between Haiti and Jamaica). Exch. U. S. Nat. Mus.

PROC. AMER. PHIL. SOC., **23**, 1886, p. 265.

A large entire specimen in rather poor preservation.

CYCLURA PINGUIS Barbour HOLOTYPE

12082. One. Anegada Id., Br. W. I. J. L. Peters. Museum Exped. 1917.

PROC. BIOL. SOC. WASH., **30**, 1917, p. 100.
A beautiful adult preserved entire, unique.

CYCLURA PORTORICENSIS Barbour HOLOTYPE AND PARATYPE

12460. One. Ciales Cave, Porto Rico. G. M. Allen and J. L. Peters. Museum Exped. 1917.

16871. One. Ciales Cave, Porto Rico. G. M. Allen and J. L. Peters. T. Barbour. 1917.

PROC. BIOL. SOC. WASH., **32**, 1919, p. 146.
Well-preserved bones, the species probably being but very recently extinct.

CYCLURA RILEYI Stejneger PARATYPE

9272. One. Watling's Id., Bahamas, Br. W. I. J. H. Riley. Exch. U. S. Nat. Mus. 1913.

PROC. BIOL. SOC. WASH., **16**, 1903, p. 130.
An entire half-grown specimen in fair condition.

CYCLURA STEJNEGERI Barbour and Noble PARATYPE

11145. One. Mona Id., U. S. A., W. I. B. S. Bowdish. Exch. U. S. Nat. Mus. 1915.

BULL. MUS. COMP. ZOÖL., **60**, 1916, p. 163, pl. 12.
A skin of an old adult poorly preserved in alcohol.

DASIA GRIFFINI Taylor PARATYPE

26411. One. Taytay, Palawan Id., Philippine Is. L. E. Griffin. T. Barbour. 1927.

PHIL. JOUR. SCI., **10**, 1915, p. 104, pl. 1, figs. 5 and 6.
Excellent condition.

DASIA MOULTONI Barbour and Noble HOLOTYPE

11203. One. Sadong, Sarawak, Borneo. H. W. Smith. H. W. Smith. 1912.

PROC. N. ENG. ZOÖL. CLUB, **6**, 1916, p. 22.
A fine example.

DASIA OLIVACEA GRIFFINI (Taylor) See DASIA GRIFFINI Taylor PARATYPE

D(ASIA) SMARAGDINUM MOLUCCARUM Barbour

HOLOTYPE AND PARATYPES

7481. One. Wahaai, Ceram Id., Moluccas. T. Barbour. T. Barbour. 1907.
7709. Six. Lawui, Obi Major Id., Ternate Id. T. Barbour. T. Barbour. 1907.
7710. Five. Lawui, Obi Major Id., Ternate Id. T. Barbour. T. Barbour. 1907.
7716. One. Wahaai, Ceram Id. T. Barbour. T. Barbour. 1907.
7718. One. Piroe, Ceram Id. T. Barbour. T. Barbour. 1907.
7719. One. Galela, Halmahera Id. T. Barbour. T. Barbour. 1907.

PROC. BIOL. SOC. WASH., **24**, 1911, p. 17.
A beautiful adult of this well-defined race or possibly even species.

DASIA SMARAGDINUM PERVIRIDIS Barbour HOLOTYPE AND PARATYPES

14282. One. Fulakora, Ysabel Id., Solomon Is. W. M. Mann. Museum Exped. 1919.
15046–52. Seven. Graciosa Bay, Santa Cruz Archipelago, Solomon Is. W. M. Mann. Museum Exped. 1919.
15053–54. Two. Ysabel Id., Solomon Is. W. M. Mann. Museum Exped. 1919.
15072. One. Malaita Id., W. M. Mann. Museum Exped. 1919.

PROC. N. ENG. ZOÖL. CLUB, **7**, 1921, p. 106.
A beautiful specimen.

DEIROPTERYX BARTSCHI Cochran PARATYPE

26950. One. Vinales, Cuba. Paul Bartsch. Exch. U.S. Nat. Mus. 1928.

PROC. BIOL. SOC. WASH., **41**, 1928, p. 169.
Excellent condition.

DELMA RETICULATA Garman = DELMA TINCTA De Vis HOLOTYPE

6486. One. Cooktown, Queensland, Australia. E. A. Olive. Great Barrier Reef Exped. 1896.

BULL. MUS. COMP. ZOÖL., **39**, 1901, p. 5.
This allocation of Garman's species has recently been proposed by Kinghorn. Our specimen is excellently well preserved.

DELMA TINCTA De Vis. See DELMA RETICULATA Garman. HOLOTYPE

DENDROPHIS PICTUS TIMORENSIS Malcolm Smith PARATYPES

25282–83. Two. Soë, S. Timor. Malcolm Smith. T. Barbour. 1927.

PROC. ZOÖL. SOC., 1927, p. 222.
Excellent condition.

DENISONIA VAGRANS Garman HOLOTYPE

6490. One. Dunk Id., Queensland. A. Agassiz. Great Barrier Reef Exped. 1896.

BULL. MUS. COMP. ZOÖL., **39**, 1901, p. 13.

A fine specimen, considered by Garman as a "variety" of *Denisonia signata*. Our material is scanty but we suspect a valid insular species.

DERMOCHELYS SCHLEGELII (Garman). See SPHARGIS CORIACEA *var.* SCHLEGELII Garman

DERMOPHIS CRASSUS Cope COTYPE

6636. One. Upper Beni, Bolivia. E. R. Heath. Exch. Acad. Nat. Sci. Phila. 1918.

PROC. AMER. PHIL. SOC., 1884 (1885), p. 184.

A fine specimen; others in the Philadelphia Academy of Natural Sciences.

DERMOPHIS MEXICANUS CLARKII (Barbour). See GYMNOPHIS CLARKII Barbour HOLOTYPE

DESMOGNATHUS BRIMLEYORUM Stejneger PARATYPES

2598. Two. Hot Springs, Arkansas. H. H. and C. S. Brimley. Exch. U. S. Nat. Mus. 1909.

PROC. U. S. NAT. MUS., **17**, 1895, p. 597.

Fine examples of this distinct species.

DIAPHORANOLIS BROOKSI Barbour HOLOTYPE AND GENOTYPE

16297. One. Mt. Sapo, E. Panama, 2,500 ft. Barbour and Brooks. T. Barbour. 1922.

OCC. PAPERS MUS. ZOÖL. UNIV. MICH., **129**, 1923, p. 7.

A perfect example, so far unique, of one of the most peculiar and gaily decorated of neotropical lizards.

DICRODON BARBOURI Noble HOLOTYPE AND PARATYPES
= DICRODON LENTIGINOSUS BARBOURI (Noble)

17972. One. Sullana, Piura, Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.

18778–83. Fourteen paratypes.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1924, p. 108.

A nice series of a pallid desert form. The paratypes available for exchange are well-preserved but tailless.

Mr. C. E. Burt has recently compared the types of *Cnemidophorus lentiginosus* Garman with those of *Dicrodon barbouri* Noble. He states that both are *Dicrodon*, and that the relationship between the two supposed species is very close and not more than subspecific.

DICRODON LENTIGINOSUS BARBOURI (Noble). See DICRODON BARBOURI Noble HOLOTYPE AND PARATYPES

DICRODON LENTIGINOSUS LENTIGINOSUS (Garman). See CNEMIDOPHORUS LENTIGINOSUS Garman COTYPES

DIEMYCTYLUS VIRIDESCENS VITTATUS H. Garman
= TRITURUS VIRIDESCENS DORSALIS (Harlan) COTYPES

1992. Two. Wilmington, N. C., U. S. A. H. Garman. H. Garman. 1883.

JOUR. CINCINNATI SOC. NAT. HIST., **19**, 1897, p. 49, figs.

Whether there are other cotypes in Professor Garman's possession or deposited elsewhere, we do not know, but these agree strikingly with the figures. Described as "var. *vittatus*."

DINODON RUFOZONATUM WILLIAMSI Schmidt PARATYPE

26616. One. Changsha, Hunan, China. J. W. Williams. Exch. Am. Mus. Nat. Hist. 1928.

AMER. MUS. NOVIT., NO. 175, 1925, p. 2.

Excellent condition.

DIPLODACTYLUS SPINIGERUS Gray. See PEROPUS PUSILLUS Cope HOLOTYPE

DIPLOGLOSSUS CRUSCULUS Garman
= CELESTUS OCCIDUUS (Shaw) HOLOTYPE

6051. One. Kingston, Jamaica. S. Garman. Blake Exped. 1879.

BULL. ESSEX INST., **19**, 1887, p. 22.

Apparently based on the young of Shaw's species, a fine specimen.

DIPLOGLOSSUS ENNEAGRAMMUS Cope. See SIDEROLAMPRUS ENNEAGRAMMUS Cope HOLOTYPE

DIPLOGLOSSUS MACULATUS Garman HOLOTYPE
= CELESTUS MACULATUS (Garman)

6231. One. Cayman Brac, Br. W. I. C. J. Maynard. Purchased. 1888.

BULL. ESSEX INST., **20**, 1888, p. 5.

A fair example of a rather poorly differentiated form.

DIPLOGLOSSUS RESPLENDENS Barbour HOLOTYPE

7286. One. Junction of Kaka and Beni Rivers. Tropical Eastern Bolivia. Frank J. Dunleavy. T. Barbour. 1909.

PROC. N. ENG. ZOÖL. CLUB, **4**, 1909, p. 50, pl. 4.

A gorgeous creature when freshly captured. Mr. Dunleavy brought it up to La Paz and gave it to me there. The red has now faded considerably. It is by far the most handsome species of the genus.

DIPLOGLOSSUS STENURUS Cope HOLOTYPE
= CELESTUS COSTATUS (Cope)

3612. One. Jeremie, Haiti. D. F. Weinland. Purchased. 1859.

PROC. ACAD. NAT. SCI. PHILA., 1862, p. 188.

Another recovery from Philadelphia in poor condition. Cope was uninterested in returning material, his studies once finished, and many of the specimens borrowed by him are as yet unfound.

DIPSADOBOA ELONGATA (Barbour). See CROTAPHOPELTIS ELONGATA Barbour. HOLOTYPE

DRACO DAUDINII Duméril and Bibron COTYPES
= DRACO VOLANS Linné

2180. Two. Java. Exch. Paris. Mus. through A. Duméril. 1865.

ERP. GÉN., **4**, 1837, p. 451.

Faded but perfect specimens.

DRACO GRACILIS Barbour HOLOTYPE AND PARATYPE

6713. One. Sarawak, Borneo. W. T. Hornaday. Purchased. 1905.
6767. One. Sarawak, Borneo. W. T. Hornaday. Purchased. 1905.

PROC. BIOL. SOC. WASH., **16**, 1903, p. 59.

An apparently distinct species, yet curiously it does not appear in recent collections. The area which Hornaday explored has been visited again and again by really good collectors and is now thoroughly well known.

DRACO VOLANS Linné. See DRACO DAUDINII Duméril and Bibron COTYPES

DREPANODON EATONII Ruthven HOLOTYPE AND PARATYPE

8831. One. Machu Pichu, Cuzco Dept., Peru, 9,500 ft. G. F. Eaton. Yale Peruvian Exped. 1913.
8830. One. Machu Pichu, Cuzco Dept., Peru, 9,500 ft. G. F. Eaton. Yale Peruvian Exped. 1913.

PROC. ACAD. NAT. SCI. PHILA., **65**, 1913, p. 506.

According to Amaral a valid species.

DREPANODON ERDISII Barbour HOLOTYPE
= PSEUDOBOA DOLIATA (Duméril and Bibron)

8829. One. Machu Pichu, Cuzco Dept., Peru, 9,500 ft. G. F. Eaton. Yale Peruvian Exped. 1913.

PROC. ACAD. NAT. SCI. PHILA., 1913, p. 506.
Dr. Amaral has examined this type, an immature example, and has declared it a synonym. He is correct.

DROMICODRYAS BERNIERI Duméril and Bibron COTYPE

1966. One. Madagascar. Exch. Paris Mus. through A. A. Duméril. 1865.

ERP. GÉN., **7**, 1854, p. 211, p. 46.
A rather soft and faded specimen.

DROMICUS AMAZONICUS Dunn HOLOTYPE

2820. One. Santarem, Brazil. Charles Linden. Charles Linden. 1873.

PROC. BIOL. SOC. WASH., **35**, 1922, p. 219.
A fairly well-preserved example.

DROMICUS ANGULIFER Bibron COTYPE
= ALSOPHIS ANGULIFER (Bibron)

2195. One. Cuba. Exch. Paris Mus. through A. A. Duméril. 1865.

R. DE LA SAGRA: "HIST. CUBA, ERP.," 1843, p. 222.
A poor, ill-preserved example.

DROMICUS CUBENSIS Garman COTYPES
= LEIMADOPHIS ANDREAE ANDREAE (Reinhardt and Lutken)

172. One. Cuba.
1979. One. Cuba. Exch. Paris Mus. through A. A. Duméril. 1865.
6127. One. Cuba. S. Garman. Blake Exped. 1879.
9354. One. Cuba. F. Poey. F. Poey.

PROC. AMER. PHIL. SOC., 1887, p. 281.
In various states of preservation.

DROMICUS PARVIFRONS Cope COTYPES
= LEIMADOPHIS PARVIFRONS PARVIFRONS (Cope)

3344, 3602. Five. Jeremie, Haiti. D. F. Weinland. Purchased. 1865.

PROC. ACAD. NAT. SCI. PHILA., 1862, p. 79.
In fair preservation.

DROMICUS PUTNAMI Jan = MANOLEPIS PUTNAMI (Jan) HOLOTYPE

824. One. On ship from San Blas, Mexico. E. S. Cammar. E. S. Cammar. 1862.

ELENCO SYST., 1863, p. 67.
A good specimen.

DROMICUS TEMPORALIS Cope HOLOTYPE
= UROTHECA LATERISTRIGA (Berthold)

297. One. "Probably Cuba." Undoubtedly from Central America. "F. Poey."

PROC. ACAD. NAT. SCI. PHILA., 1860, p. 370.
In poor condition.

DRYMOBIUS BODDAERTII (Sentzen). See ALSOPHIS BRUESI Barbour COTYPES
ALSOPHIS PULCHER Garman HOLOTYPE

EBENAVIA INUNGUIS Boettger COTYPE

17635. One. Nossi-bé, Madagascar. A. Stumpff. Exch. Senck. Mus. 1883.

ABH. SENCK. NATURF. GES., **11**, 1878, p. 276, pl. 1, fig. 3.
In fair condition.

ECHIDNA GABONICA Duméril and Bibron COTYPE
= BITIS GABONICA (Duméril and Bibron)

2107. One. Gaboon. Exch. Paris Mus. through A. A. Duméril. 1864.

ERP. GÉN., **7**, 1854, p. 1428, pl. 80, fig. b.
A poor old specimen.

ECHINOSAURA PANAMENSIS Barbour HOLOTYPE AND PARATYPES

17746. One. La Loma, Mts. of W. Panama, on boundary of Chiriqui and Bocas del Toro Provinces. Dunn and Duryea. T. Barbour. 1923.

18857–60. Four. La Loma, Mts. of W. Panama, on boundary of Chiriqui and Bocas del Toro Provinces. Dunn and Duryea. T. Barbour. 1923.

PROC. N. ENG. ZOÖL. CLUB, **9**, 1924, p. 8.
Excellent specimens.

EGERNIA WHITII Lacépède. See LYGOSOMA MONILIGERA Duméril and Bibron COTYPES

EIRENIS AGASSIZII Jan = PSEUDABLABES AGASSIZII (Jan) COTYPE

870. One. Uruguay. J. Wyman. J. Wyman. 1862.

ARCHIV. ZOÖL. ANAT. PHYS., **2**, 1863, p. 260.
Fair condition for an old specimen.

ELAPOMORPHUS NUCHALIS Barbour HOLOTYPE
= TANTILLA MELANOCEPHALA (Linné)

1164. One. Villa Bella, above Santarem, Brazil. J. C. Fletcher. J. C. Fletcher. 1863.

PROC. BIOL. SOC. WASH., **27**, 1914, p. 199.
Type made as the result of a stupid blunder. In good condition.

ELAPS COLUMBIANUS Griffin PARATYPE
= MICRURUS CORALLINUS (Wied.)

11865. One. Bonda, Colombia. H. H. Smith. Exch. Carnegie Mus. 1916.

MEM. CARNEGIE MUS., **7**, 1915, p. 216.
In good condition. True identity determined by Dr. Amaral.

ELAPS RUATANUS Günther COTYPE
= MICRURUS NIGROCINCTUS RUATANUS (Günther)

26930. One. Ruatan Id., Bay Is., Caribbean Sea. Exch. British Mus. 1928.

BIOL. CENTR. AMER., REPT., 1895, p. 185, pl. 57, fig. B.
Good condition.

ELEUTHERODACTYLUS ALTAMAZONICUS Barbour and Dunn HOLOTYPE

2028. One. Upper Amazons, probably Nauta, Brazil. Thayer Exped.?

PROC. BIOL. SOC. WASH., **34**, 1921, p. 161.
A good specimen.

ELEUTHERODACTYLUS ATKINSI Dunn HOLOTYPE AND PARATYPES

10587. Type. Near Soledad, Cienfuegos, Cuba. E. R. Dunn. T. Barbour. 1925.

10588–98. Ten. Near Soledad, Cienfuegos, Cuba. E. R. Dunn. T. Barbour. 1925.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1925, p. 165.
The type and ten paratypes are well preserved.

ELEUTHERODACTYLUS AURICULATOIDES Noble PARATYPES
= ?ELEUTHERODACTYLUS AURICULATUS (Cope)

9321–22. Two. Paso Bajito, Santo Domingo. G. K. Noble. Exch. Amer. Mus. Nat. Hist. 1923.

AMER. MUS. NOVIT., **61**, 1923, p. 3.
Two good specimens of this doubtfully distinct species.

?ELEUTHERODACTYLUS AURICULATUS (Cope). See ELEUTHERODACTYLUS AURICULATOIDES Noble PARATYPES

ELEUTHERODACTYLUS BINGHAMI Stejneger PARATYPES
= GASTROTHECA BOLIVIANA (Steindachner)

4173–74. Two. Cuzco, Peru, 11,500 ft. Yale Peruvian Exped. Exch. U. S. Nat. Mus. 1917.

PROC. U. S. NAT. MUS., **45**, 1913, p. 542.
Two young examples in good condition.

ELEUTHERODACTYLUS BLAIRI Barbour HOLOTYPE AND PARATYPE

13036. One. Gutierrez, Bocas del Toro Province, Panama Republic. Dunn and Duryea. T. Barbour. 1927.
13037–38. Two. Gutierrez, Bocas del Toro Province, Panama Republic. Dunn and Duryea. T. Barbour. 1927.

PROC. N. E. ZOÖL. CLUB, **10**, 1928, p. 29, pl. 3.
These specimens have been critically examined by Schmidt who considers the species perfectly distinct.

ELEUTHERODACTYLUS BRICENI (Boulenger). See HYLODES BRICENI Boulenger COTYPES

ELEUTHERODACTYLUS BRITTONI Schmidt PARATYPE

9361. One. Porto Rico. K. P. Schmidt. Exch. Amer. Mus. Nat. Hist. 1923.

ANN. N. Y. ACAD. SCI., **28**, 1920, p. 179.
Well preserved.

ELEUTHERODACTYLUS CAJAMARCENSIS Barbour and Noble HOLOTYPE

5407. One. Huambos, Cajamarca, Peru. G. K. Noble. Harvard Peruvian Exped. 1916.

BULL. MUS. COMP. ZOÖL., **58**, 1920, p. 404.
A fair specimen.

ELEUTHERODACTYLUS CARYOPHYLLACEUS (Barbour). See SYRRHOPHUS CARYOPHYLLACEUS Barbour HOLOTYPE AND PARATYPES

ELEUTHERODACTYLUS CASPARII Dunn HOLOTYPE AND PARATYPES

11130. One. Mina Carlota, near Cienfuegos, Cuba. E. R. Dunn. T. Barbour. 1925.
11430–33. Fourteen. Mina Carlota, near Cienfuegos, Cuba. E. R. Dunn. T. Barbour. 1925.
10619–23. Five. Hoyo Colorado at San Blas, Cuba. E. R. Dunn. T. Barbour. 1925.
10626–30. Five. Electric Plant at San Blas, Cuba. E. R. Dunn. T. Barbour. 1925.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1926, p. 215.
The type and series of paratypes are well preserved.

ELEUTHERODACTYLUS CERASINUS (Cope). See ELEUTHERODACTYLUS PERALTAE Barbour HOLOTYPE

ELEUTHERODACTYLUS CUNDALLI Dunn HOLOTYPE AND PARATYPES

11126. One. Spaldings, Clarendon Parish, Jamaica (2,900 ft.). E. R. Dunn. T. Barbour. 1925.
11301–25. Twenty-five. Spaldings, Clarendon Parish, Jamaica (2,900 ft.). E. R. Dunn. T. Barbour. 1925.
11586–91. Six. Port Antonio, Jamaica. A. E. Wight. Purchased.

PROC. BOSTON SOC. NAT. HIST., **38**, 1926, p. 121.
The type and series of paratypes are in beautiful condition.

ELEUTHERODACTYLUS DUNNII Barbour HOLOTYPE AND PARATYPES

8242. One. Cerro de los Estropajos, W. of Jalapa, Mexico. E. R. Dunn. T. Barbour. 1921.
8243. One. Cerro de los Estropajos, W. of Jalapa, Mexico. E. R. Dunn. T. Barbour. 1921.
8244. One. Xico, near Jalapa, Mexico. E.R. Dunn. T. Barbour. 1921.

PROC. BIOL. SOC. WASH., **35**, 1922, p. 111.
Good specimens.

ELEUTHERODACTYLUS EILEENAE Dunn HOLOTYPE AND PARATYPES

11128. One. Mina Carlota, near Cienfuegos, Cuba. E. R. Dunn. T. Barbour. 1925.
11444–60. Seventeen. Mina Carlota, near Cienfuegos, Cuba. E. R. Dunn. T. Barbour. 1925.

3726. One. Guane, Cienfuegos, Cuba. Barbour and Brooks. T. Barbour. 1925.

10615–18. Four. Hoyo Colorado, Cuba. E. R. Dunn. T. Barbour. 1925.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1926, p. 212.
The type and paratypes are well preserved.

ELEUTHERODACTYLUS EMILIAE Dunn HOLOTYPE AND PARATYPES

11129. One. Mina Carlota, near Cienfuegos, Cuba. E. R. Dunn. T. Barbour. 1925.

11461–85. Twenty-five. Mina Carlota, near Cienfuegos, Cuba. E. R. Dunn. T. Barbour. 1925.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1926, p. 213.
Good condition.

ELEUTHERODACTYLUS FLAVESCENS Noble PARATYPE

9393. One. La Bracita, Santo Domingo. G. K. Noble. Exch. Amer. Mus. Nat. Hist. 1923.

AMER. MUS. NOVIT., **61**, 1923, p. 2.
A fine species and a good specimen.

ELEUTHERODACTYLUS FOOTEI Stejneger PARATYPE

4172. One. Tincochchaca, Peru (7,000 ft.). Yale-Peruvian Exped. Exch. U. S. Nat. Mus. 1917.

PROC. U. S. NAT. MUS., **45**, 1913, p. 543.
A good but young specimen.

ELEUTHERODACTYLUS GOSSEI Dunn HOLOTYPE AND PARATYPES

11125. One. Spaldings, Clarendon Parish, Jamaica (2,900 ft.). E. R. Dunn. T. Barbour. 1925.

11326–37. Twelve. Spaldings, Clarendon Parish, Jamaica (2,900 ft.). E. R. Dunn. T. Barbour. 1925.

2045. Two. Moneague, Jamaica. Dr. H. Bryant.

2568, 4886–91. Eighteen. Mandeville, Jamaica. Barbour and Wight. T. Barbour. 1919.

10167–69. Twenty-two. Balaclava, Jamaica. A. E. Wight. T. Barbour. 1924.

PROC. BOSTON SOC. NAT. HIST., **38**, 1926, p. 118.
Type and paratypes, a beautiful series.

ELEUTHERODACTYLUS GRABHAMI Dunn HOLOTYPE AND PARATYPES

11127. One. Spaldings, Clarendon Parish, Jamaica (2,900 ft.). E. R. Dunn. T. Barbour. 1925.
11338–46. Nine. Spaldings, Clarendon Parish, Jamaica (2,900 ft.). E. R. Dunn. T. Barbour. 1925.
11049–50. Two. Cinchona, Jamaica. C. T. Brues. C. T. Brues. 1912.
11069–73. Five. Mandeville, Jamaica. T. Barbour. T. Barbour. 1909.
11592. One. Newton, Jamaica. C. T. Brues. C. T. Brues. 1912.

PROC. BOSTON SOC. NAT. HIST., **38**, 1926, p. 121.
A fine lot, type and paratypes.

ELEUTHERODACTYLUS GREYI Dunn HOLOTYPE AND PARATYPES

11131. One. Soledad, near Cienfuegos, Cuba. E. R. Dunn. T. Barbour. 1925.
11527–34. Eight. Soledad, near Cienfuegos, Cuba. E. R. Dunn. T. Barbour. 1925.
10614. One. Hoyo Colorado, Cuba. E. R. Dunn. T. Barbour. 1925.
11065–68. Four. Electric Plant, Cuba. Dr. Bles for E. R. Dunn. T. Barbour. 1925.
11486–510. Twenty-five. Mina Carlota, Cuba. E. R. Dunn. T. Barbour. 1925.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1926, p. 213.
Type and paratypes well preserved.

ELEUTHERODACTYLUS GRYLLUS Schmidt PARATYPE

9360. One. Peak of El Yunque, Porto Rico. K. P. Schmidt. Exch. Amer. Mus. Nat. Hist. 1923.

ANN. N. Y. ACAD. SCI., **28**, 1920, p. 172.
A good specimen of a pretty little species.

ELEUTHERODACTYLUS GUNDLACHI Schmidt nom. nov. See ELEUTHERODACTYLUS PLICATUS Barbour HOLOTYPE

ELEUTHERODACTYLUS INOPTATUS (Barbour). See LEPTODACTYLUS INOPTATUS Barbour HOLOTYPE

ELEUTHERODACTYLUS INSIGNITUS Ruthven PARATYPE

4074. One. Heights east of San Miguel, Colombia. M. A. Carriker. Exch. Univ. Mich. Mus. 1916.

OCC. PAPERS MUS. ZOÖL. UNIV. MICH., **34**, 1919, p. 1, pl. 1, 3 text figs.
A fine example of a giant species.

ELEUTHERODACTYLUS JAMAICENSIS Barbour COTYPES

2512. Five. Mandeville, Jamaica. T. Barbour. T. Barbour. 1909.

BULL. MUS. COMP. ZOÖL., **52**, 1910, p. 287.
Good specimens of a most distinct form.

ELEUTHERODACTYLUS JOHNSTONEI Barbour COTYPES

2759. Two. St. George, Grenada, Br. W. I. G. M. Allen. T. Barbour. 1911.

MEM. MUS. COMP. ZOÖL., **44**, 1914, p. 249.
Two cotypes and a long series of paratypes represent this species which is very close to *E. martinicensis*.

ELEUTHERODACTYLUS JUNORI Dunn HOLOTYPE AND PARATYPES

11124. One. Spaldings, Clarendon Parish, Jamaica (2,900 ft.). E. R. Dunn. T. Barbour. 1925.

11347–52. Six. Spaldings, Clarendon Parish, Jamaica (2,900 ft.). E. R. Dunn. T. Barbour. 1925.

PROC. BOSTON SOC. NAT. HIST., **38**, 1926, p. 120.
Dunn took the type and a few paratypes of this rather rare form and preserved them very well.

ELEUTHERODACTYLUS LYMANI Barbour and Noble HOLOTYPE AND PARATYPES

5422. One. Perico, Valley of the Chinchipe R., Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.

5408 etc. Eight. Perico, Valley of the Chinchipe R., Peru. G. K. Noble. Harvard–Peruvian Exped. 1916.

5423 etc. Six. Bellavista, Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.

5436. One. Palambla, Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.

BULL. MUS. COMP. ZOÖL., **58**, 1920, p. 403.
Noble preserved an excellent series of this species from the neighborhood of Bellavista, Dept. of Jaen, Peru.

ELEUTHERODACTYLUS MINUTUS Noble PARATYPE

9338. One. Paso Bajito, Santo Domingo. G. K. Noble. Exch. Amer. Mus. Nat. Hist. 1923.

AMER. MUS. NOVIT., **61**, 1923, p. 4.
A good specimen.

ELEUTHERODACTYLUS NOBLEI Barbour and Dunn
HOLOTYPE AND PARATYPES

7827. One. Guapiles, Costa Rica. E. R. Dunn. T. Barbour. 1920.
7826. One. Guapiles, Costa Rica. E. R. Dunn. T. Barbour. 1920.
8024. Two. San Miguel Id., Bay of Panama. W. W. Brown, Jr. T. Barbour. 1921.

PROC. BIOL. SOC. WASH., **34**, 1921, p. 161.
Soft and poorly preserved.

ELEUTHERODACTYLUS NUBICOLA Dunn HOLOTYPE AND PARATYPES

2846. One. Chinchona, Jamaica 5,000 ft. C. T. Brues. C. T. Brues. 1912.
2845. Five. Newton, Jamaica, 3,200 ft. C. T. Brues. C. T. Brues. 1912.
11784–86. Three. Chinchona, Jamaica, 4,500 ft. C. T. Brues. C. T. Brues. 1912.

PROC. BOSTON SOC. NAT HIST., **38**, 1926, p. 116.
We have renumbered three Chinchona specimens, leaving No. 2846 attached to the specimen which served Dunn for his type. All the others are paratypes.

ELEUTHERODACTYLUS OBESUS (Barbour). See SYRRHOPHUS OBESUS Barbour HOLOTYPE AND PARATYPE

ELEUTHERODACTYLUS PANTONI Dunn HOLOTYPE AND PARATYPES

11123. One. Spaldings, Clarendon Parish, Jamaica (2,900 ft.). E. R. Dunn. T. Barbour. 1925.
11376–400. Twenty-five. Spaldings, Clarendon Parish, Jamaica (2,900 ft.). E. R. Dunn. T. Barbour. 1925.
2564, 4884–85, 11074–75. Five. Mandeville, Jamaica. Barbour and Wight. T. Barbour. 1909–19.

PROC. BOSTON SOC. NAT. HIST., **38**, 1926, p. 119.
A large and well-preserved series.

ELEUTHERODACTYLUS PERALTAE Barbour
= ELEUTHERODACTYLUS CERASINUS (Cope). HOLOTYPE

13061. One. Peralta, Costa Rica (300 m.). C. R. Lankester. C. R. Lankester. 1927.

PROC. N. ENG. ZOÖL. CLUB, **10**, 1928, p. 30, pl. 4, fig. 1.
Good condition.

ELEUTHERODACTYLUS PERSIMILIS Barbour HOLOTYPE AND PARATYPES

11598. One. Suretka, Costa Rica. Dunn and Duryea. T. Barbour. 1923.

11599–610. Fourteen. Suretka, Costa Rica. Dunn and Duryea. T. Barbour. 1923.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1926, p. 193, pl. 14.

A pretty little species of the *rhodopis* group represented by the well-preserved type and fourteen paratypes.

ELEUTHERODACTYLUS PINARENSIS Dunn HOLOTYPE AND PARATYPES

3814. One. Isla de Pinos, Cuba. G. A. Link. Exch. Carnegie Mus. 1915.

3048. One. San Diego de Los Banõs, Cuba. T. Barbour. T. Barbour. 1912.

4176–90. Fifteen. Luis Lazo, Cuba. T. Barbour. T. Barbour. 1917.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1926, p. 213.

The type and several paratypes from various localities in western Cuba are mostly in good preservation.

ELEUTHERODACTYLUS PLICATUS Barbour
= ELEUTHERODACTYLUS GUNDLACHI Schmidt nom. nov.
HOLOTYPE

3056. One. La Union, Monte Libano Guantanamo, Cuba. C. T. Ramsden. C. T. Ramsden. 1913.

MEM. MUS. COMP. ZOÖL., **44**, 1914, p. 244.

A good specimen but inadvertently given a used name. Schmidt (Proc. Linn. Soc. N. Y., **33**, 1920, p. 3) has pointed this out and renamed the species.

ELEUTHERODACTYLUS PODICIFERUS (Cope). See LITHODYTES PODICIFERUS Cope COTYPE

ELEUTHERODACTYLUS RUTHAE Noble PARATYPE

9359. One. Samana, Santo Domingo. John King. Exch. Amer. Mus. Nat. Hist. 1923.

AMER. MUS. NOVIT., **61**, 1923, p. 6.

A fine specimen.

ELEUTHERODACTYLUS SANCTAE-MARTAE Ruthven PARATYPE

8972–73. Two. Sta. Marta Mts., Colombia. A. G. Ruthven. Exch. Univ. Mich. Mus. 1922.

OCC. PAPERS MUS. ZOÖL. UNIV. MICH., **39**, 1917, p. 1, pl. 1, fig. 1.

Two good specimens of this very distinct form.

ELEUTHERODACTYLUS SCHMIDTI Noble PARATYPES

9323–24. Two. La Bracita, Santo Domingo. G. K. Noble. Exch. Amer. Mus. Nat. Hist. 1923.

AMER. MUS. NOVIT., **61**, 1923, p. 5.
Good specimens.

ELEUTHERODACTYLUS SONANS Dunn HOLOTYPE AND PARATYPES

10609. One. Soledad, Cienfuegos, Cuba. E. R. Dunn. T. Barbour. 1925.

10605–08 }
10610–13 } Eight. Soledad, Cienfuegos, Cuba. E. R. Dunn. T. Barbour. 1925.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1925, p. 164.
A fine little series.

ELEUTHERODACTYLUS UNISTRIGATUS (Günther). See PROSTHERAPIS EQUATORIALIS Barbour COTYPES

ELEUTHERODACTYLUS VARIANS (Gundlach and Peters). See HYLODES VARIANS Gundlach and Peters. COTYPE

ELEUTHERODACTYLUS VARLEYI Dunn HOLOTYPE AND PARATYPE

10601. One. Near Soledad, Cienfuegos, Cuba. E. R. Dunn. T. Barbour. 1925.

10599–600 }
10602 } Three. Near Soledad, Cienfuegos, Cuba. E. R. Dunn. T. Barbour. 1925.

10603–04. Two. Guabairo, Cuba. E. R. Dunn. T. Barbour. 1925.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1925, p. 163.
In good preservation.

ELEUTHERODACTYLUS WEINLANDI Barbour HOLOTYPE

2050. One. Puerto Plata, Santo Domingo. M. Abbott Frazar. Purchased. 1881.

MEM. MUS. COMP. ZOÖL., **44**, 1914, p. 246.
An excellent specimen.

ELEUTHERODACTYLUS WHYMPERI (Boulenger). See HYLODES WHYMPERI Boulenger COTYPES

ELEUTHERODACTYLUS WIGHTMANAE Schmidt PARATYPE

9358. One. Coffee Plantation, Porto Rico. K. P. Schmidt. Exch. Amer. Mus. Nat. Hist. 1923.

ANN. N. Y. ACAD. SCI., **28**, 1920, p. 181.
Excellent example.

EMOIA ARUNDELII (Garman). See LYGOSOMA ARUNDELII Garman HOLOTYPE

EMOIA SAMOENSE LOYALTIENSIS (Roux). See LYGOSOMA SAMOENSE LOYALTIENSIS Roux COTYPE

ENYALIOIDES HETEROLEPIS Bocourt. See ENYALIOIDES INSULAE Barbour COTYPES

ENYALIOIDES INSULAE Barbour
= ENYALIOIDES HETEROLEPIS Bocourt COTYPES

6983. Two. Gorgona Id., Colombia. W. W. Brown. J. E. Thayer. 1905.

BULL. MUS. COMP. ZOÖL., **46**, 1905, p. 100.
Two large but imperfect specimens. The identity with *heterolepis* was established by H. W. Parker of the British Museum.

EPICRATES SABOGAE Barbour COTYPES
= CONSTRICTOR CONSTRICTOR SABOGAE (Barbour)

6986. Two. Saboga Id., Islas de las Perlas, Bay of Panama. W. W. Brown. J. E. Thayer. 1905.

BULL. MUS. COMP. ZOÖL., **46**, 1906, p. 226.
Two alcoholic skins of this apparently very distinct race.

EREMIAS BARBOURI Schmidt PARATYPES

20694. One. Mai Tai Chao, Shansi, China. C. H. Pope. Exch. Field Mus. Nat. Hist. 1925.

20695, 26617–18. Three. Chen Tzu, Taiyuan fu, Shansi, China. C. H. Pope. Exch. Field Mus. Nat. Hist. and Amer. Mus. Nat. Hist. 1925 and 1928.

AMER. MUS. NOVIT., **175**, 1925, p. 2.
Good specimens.

EREMIAS BEDRIAGAE Nikolski COTYPE

22186. One. Bogorak, Bokhara, Central Asia. V. Laschin. Exch. St. Petersburg Mus. 1926.

ANN. MUS. ZOÖL. ACAD. SCI. ST. PETERSBOURG, **16**, 1911, pp. 278–281.
Good specimen.

EREMIAS BUECHNERII Bedriaga COTYPE

22187. One. Kewa, Keria Mts. N. Przewalsky. Exch. St. Petersburg Mus. 1926.

ANN. MUS. ZOÖL. ACAD. SCI. ST. PETERSBOURG, **10**, 1907, p. 184.
Good example.

EREMIAS INTERMEDIA Strauch COTYPES

22188. One. Kabadian, Bokhara, Central Asia. A. Kasnakow. Exch. St. Petersburg Mus. 1926.
22189. One. Seistan, Persia. N. Zarudny. Exch. St. Petersburg Mus. 1926.

VOY. PRZEWALSKI, REPT. AND BATR., 1876, p. 28.
Excellent examples.

EREMIAS NITIDA GARAMBENSIS Schmidt PARATYPE

13354. One. Van Kerckhofenville, Belgian Congo. Lang-Chapin Exped. Exch. Amer. Mus. Nat. Hist. 1919.

BULL. AMER. MUS. NAT. HIST., **39**, 1919, p. 511.
A very good specimen.

EREMIAS PRZEWALSKII Strauch COTYPES

22192–94. Three. Alashan Desert, Mongolia. N. Przewalsky. Exch. St. Petersburg Mus. 1926.

VOY. PRZEWALSKI, REPT. AND BATR., 1876, p. 36.
Very fair examples.

ERETMOCHELYS BISSA (Rüppell). See ERETMOCHELYS SQUAMATA Agassiz COTYPES

ERETMOCHELYS SQUAMATA Agassiz COTYPES
= ERETMOCHELYS BISSA (Rüppell)

1415. One. Bengal, India. Through J. M. Barnard. L. Agassiz. 1857.
1416. One. Singapore, Straits Settlements. Capt. W. A. Putnam. L. Agassiz. 1857.

CONTR. NAT. HIST. U. S., **1**, part 2, 1857, p. 382.
Although received in same year as date on title page of Agassiz's Contributions, **1**, nevertheless, the latter part of the volume was printed so much later that there is no doubt that these were in Agassiz's hands, and, with others which may yet be found, served as his cotypes. The identity with Rüppell's species is by no means certain. His name was proposed in Neue Wirbelthiere Abyssiniens, 1835, p. 4, pl. 2.

EUMECES PERDICICOLOR Cope COTYPE
= RIOPA SUNDEVALLI (Smith)

5777. One. Zanzibar, E. Africa. H. F. Shepard. Peabody Mus., Salem. 1886.

PROC. ACAD. NAT. SCI. PHILA., 1868, p. 317.
A bleached specimen.

EURYCEA BISLINEATA WILDERAE Dunn HOLOTYPE AND PARATYPES

5848. One. White Top, Virginia. E. R. Dunn. T. Barbour. 1919.
5841–47, 5849–56 } Fifteen. White Top, Virginia. E. R. Dunn. T. Barbour. 1919.

5857–63. Seven. Linville, North Carolina. E. R. Dunn. T. Barbour. 1919.
5867–76. Ten. Mt. Sterling, North Carolina. E. R. Dunn. T. Barbour. 1919.

PROC. BIOL. SOC. WASH., **33**, 1920, p. 134.
A nice well-preserved series of adults and larvae.

EURYCEA MELANOPLEURA (Cope). See SPELERPES STEJNEGERI Eigenmann COTYPE

EUTAENIA FAIREYI Baird and Girard COTYPE
= THAMNOPHIS PROXIMUS (Say)

401. One. Prairie Mer Rouge, Louisiana, U. S. A. James Fairey. Exch. U. S. Nat. Mus.

CAT. N. AMER. REPT., **1**, 1853, p. 25.
A soft, old specimen.

GASTROTHECA BOLIVIANA (Steindachner). See ELEUTHERODACTYLUS BINGHAMI Stejneger PARATYPES

GASTROTHECA MONTICOLA Barbour and Noble
HOLOTYPE AND PARATYPES

5290. One. Huancabamba, Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.
5291 etc. Forty-three. Huancabamba, Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.
5328–31. Four. Querecotilla, Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.

BULL. MUS. COMP. ZOÖL., **58**, 1920, p. 426, pl. 2, figs. 1–2.

GEHYRA MUTILATA (Wiegmann). See PEROPUS PACKARDII Cope
COTYPE

GEKKO MINDORENSIS Taylor PARATYPES

20151–52. Two. Calapan, Mindoro, Philippine Is. E. H. Taylor. Exch. Carnegie Mus. 1925.

PHIL. JOUR. SCI., **14**, 1919, p. 115.
Excellent examples.

GEKKO PALAWANENSIS Taylor HOLOTYPE AND PARATYPE

26136. One. Thumb Peak, Palawan Id., Philippine Is. E. H. Taylor. T. Barbour. 1927.

26137. One. Thumb Peak, Palawan Id., Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **26**, 1925, p. 99.
Excellent condition.

GEKKO SMARAGDINUS Taylor PARATYPES

26138–42. Five. Polillo Id., Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **21**, 1922, p. 187, pl. 5, fig. 1.
Excellent condition.

GEOPHIS LATIFRONTALIS Garman HOLOTYPE
= ATRACTUS LATIFRONTALIS (Garman)

4538. One. Mts. of Alvarez, 16 leagues S. E. San Luis, Potosi, Mexico. E. Palmer. Purchased. 1879.

MEM. MUS. COMP. ZOÖL., **8**, 1883, p. 103.
In fair condition.

GEOPHIS MULTITORQUES YUCATANICUS Barbour and Cole HOLOTYPE

7037. One. Chichén-Itzá, Yucatan. L. J. Cole. A. Agassiz. 1905.

BULL. MUS. COMP. ZOÖL., **50**, 1906, p. 153.
A good specimen.

GEOPHIS RHODOGASTER (Cope). See COLOPHRYS RHODOGASTER Cope.
COTYPES

GERRHOSAURUS (CICIGNA) RUFIPES Boettger COTYPES
= ZONOSAURUS RUFIPES (Boettger)

17633. One. Nossi-bé, Madagascar. A. Stumpff. Exch. Senck. Mus. 1883.

ZOÖL. ANZ., 1881, p. 358.
In rather poor preservation.

GERROSTEUS PROSOPIS Cope COTYPE
= XENOPHOLIS SCALARIS (Wucherer)

12429. One. Peru. James Orton. Exch. Acad. Nat. Sci. Phila. 1918.

PROC. ACAD. NAT. SCI. PHILA., 1874, p. 71.
Soft and badly preserved.

GLAUCONIA CARLTONI Barbour COTYPES
= LEPTOTYPHLOPS BLANFORDI (Boulenger)

3217, 3749. Three. Seventy miles S. W. of Amballa, India. M. M. Carlton. M. M. Carlton. 1864–74.

BULL. MUS. COMP. ZOÖL., **51**, 1908, p. 316.
In good condition. The species may be valid, as Wall, who suggested synonymizing it, has not seen the types.

GONATODES ATRICUCULLARIS Noble HOLOTYPE AND PARATYPES

14042. One ♂. Bellavista, Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.
14413–52, 14955–80, 18727–32. Seventy-two. Bellavista, Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.

ANN. N. Y. ACAD. SCI., **29**, 1921, p. 135.
A fine type and a host of paratypes.

GONATODES COLLARIS Garman COTYPE

9432. One. Wreck Bay, Chatham Id., Galapagos Is. G. Baur. Exch. Clark Univ. 1914.

BULL. ESSEX INST., **24**, 1892, p. 83.
Shriveled and dried. A very poor specimen indeed. The other cotype mentioned in the original description cannot be found anywhere. Perhaps from Guayaquil.

GONATODES GLAUCUS Malcolm Smith PARATYPES

16664–65. Two. Palo Condore, Siam. Malcolm Smith. T. Barbour. 1922.

JOUR. NAT. HIST. SOC. SIAM, **4**, 1921, p. 95.
Beautiful specimens.

GONATODES QUATTUORSERIATUS Sternfeld COTYPE

21923. One. Rugegewald, Belgian Mandated Territory. R. Grauer. Exch. Zoöl. Mus. Berlin. 1925.

WISS. ERGEBN. DEUTSCH. ZENTR.-AFR. EXPED., **4**, 1912, p. 202.
A fair example.

GONGYLUS BOJERII Desjardin COTYPES
= SCELOTES BOJERII (Desjardin)

2151. Two. "Isle de France" = Mauritius Id. Exch. Paris Mus. through A. A. Duméril. 1865.

ANN. SCI. NAT., **22**, 1831, p. 206.
Two rather soft and faded specimens.

GONIOCHELYS MINOR Agassiz COTYPES
= STERNOTHERUS MINOR (Agassiz)

1570. One. Mobile, Alabama, U. S. A. Dr. Nott.
1571. Two. Columbus, Georgia, U. S. A. Dr. Gessner.
1572. Two. New Orleans, Louisiana, U. S. A. Dr. Benedict (One to U. S. Nat. Mus.).

CONTR. NAT. HIST. U. S., **1**, 1857, p. 424.
A well-preserved lot. Cotypes are in the Museum of Zoölogy University of Michigan, and the U. S. National Museum.

GONIOCHELYS TRIQUETRA Agassiz COTYPE
= STERNOTHERUS CARINATUS (Gray)

15085–86. Lake Concordia, Louisiana, U. S. A. B. Chase. B. Chase. 1854.

CONTR. NAT. HIST. U. S., **1**, 1857, p. 423.
An alcoholic and two dried shells.

GONIUROSAURUS HAINANENSIS Barbour HOLOTYPE
= GONYUROSAURUS LICHTENFELDERI (Mocquard)

7104. One. Mt. Wuchi, Hainan Id. A. Owston's Collectors. T. Barbour. 1907.

BULL. MUS. COMP. ZOÖL., **51**, 1908, p. 316.
According to Schmidt (in verbis) the genus is valid but the species is apparently a synonym of one ill characterized.

GONYUROSAURUS LICHTENFELDERI (Mocquard). See GONIUROSAURUS HAINANENSIS Barbour HOLOTYPE

GRAPTEMYS PSEUDOGEOGRAPHICA OCULIFERA (Baur). See MALACOCLEMMYS OCULIFERA Baur HOLOTYPE

GRYPISCUS UMBRINUS Cope HOLOTYPE
= CYCLORHAMPHUS FULIGINOSUS (Tschudi)

1497. One. Rio de Janeiro, Brazil. Thayer Exped. Thayer Exped. 1864–65.

JOUR. ACAD. NAT. SCI., PHILA., (2) **6**, 1867, p. 205.

Cope's holotype is a ragged, ruthlessly dissected relic.

GYMNODACTYLUS AGUSANENSIS Taylor PARATYPES

20105–56. Two. Bunawan, Agusan Province, Philippine Is. E. H. Taylor. Exch. Carnegie Mus. 1925.

PHIL. JOUR. SCI., SECT. D, **10**, 1915, p. 90.

Good specimens.

GYMNODACTYLUS AMARALI Barbour HOLOTYPE

20682. One. Engenheiro Dodt, Santa Philomena, Upper Parnahyba, Brazil. A. Amaral. A. Amaral. 1925.

PROC. BIOL. SOC. WASH., **38**, 1925, p. 101.

In fair condition only.

GYMNODACTYLUS ANNULATUS Taylor PARATYPES

20101–04. Four. Bunawan, Agusan Province, Philippine Is. E. H. Taylor. Exch. Carnegie Mus. 1925.

PHIL. JOUR. SCI., SECT. D, **10**, 1915, p. 92.

Beautiful specimens.

GYMNODACTYLUS DEFOSSEI Dunn PARATYPES

26994–97. Four. Komodo Id., Dutch East Indies. Burden-Dunn Exped. T. Barbour. 1928.

AMER. MUS. NOVIT., **288**, 1927, p. 1.

Good condition.

GYMNODACTYLUS LOUISADENSIS De Vis. See GYMNODACTYLUS OLIVII Garman HOLOTYPE

GYMNODACTYLUS OERTZENI Boettger COTYPES

21913–14. Two. Kasas between Crete and Rhodes. Oertzen. Exch. Berlin Mus. 1925.

21924. One. Arimathea, Palestine. Oertzen. Exch. Berlin Mus. 1925.

SITZBER. AKAD. WISS. BERLIN, 1888, p. 152.

Soft but useful specimens.

GYMNODACTYLUS OLIVII Garman HOLOTYPE
= GYMNODACTYLUS LOUISADENSIS De Vis

6470. One. Queensland, Australia. E. A. Olive. Great Barrier Reef Exped. 1896.

BULL MUS. COMP. ZOÖL., **39**, 1901, p. 1, pl. 1, figs. 1–1a.
A large fine adult.

GYMNODACTYLUS RUSSOVI Strauch COTYPES

22166–68. Three. Tschinaz, Turkestan. Russov. Exch. St. Petersburg Mus. 1926.

MEM. ACAD. SCI. ST. PETERSBOURG, **35**, 1887, p. 49, figs. 10–12.
Good specimens.

GYMNODACTYLUS WETARIENSIS Dunn PARATYPES

26998–99. Two. Nr. Uhak, N. coast of Wetar, Dutch E. I. Burden-Dunn Exped. T. Barbour. 1928.

AMER. MUS. NOVIT., **288**, 1927, p. 2.
Good condition.

GYMNOPHIS CLARKII Barbour HOLOTYPE
= DERMOPHIS MEXICANUS CLARKII (Barbour)

11047. One. Tela, Honduras Republic. Herbert Clark. United Fruit Co. 1925.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1926, p. 191.
A very young specimen which caused the confusion of genera until more material was received.

GYMNOPHIS NICEFORI Barbour HOLOTYPE

9609. One. Honda, Colombia. H^no^. Nicéforo Maria. H^no^. Nicéforo Maria. 1924.

PROC. BIOL. SOC. WASH., **37**, 1924, p. 125.
An apparently valid species, the type being in excellent condition.

GYRINOPHILUS DANIELSI (Blatchley). See SPELERPES DANIELSI Blatchley COTYPES

HELICOPS AGASSIZII Jan HOLOTYPE
= TRETANORHINUS NIGROLUTEUS Cope

826. One. San Juan del Norte, Nicaragua. Dr. Jeffrey. Prof. Agassiz. 1862.

ARCHIV. ZOÖL. ANAT. PHYS., **3**, 1865, p. 248.
An old specimen but in moderately good shape.

HELICOPS ALLENI Garman ?HOLOTYPE
= LIODYTES ALLENI (Garman)

2255. One. Hawkinsville, St. John's R., Florida, U. S. A. J. A. Allen. J. A. Allen. 1869.

PROC. BOSTON SOC. NAT. HIST., **17**, 1874, p. 92.
The type of this, Garman's first new species, is in excellent preservation.

HELICOPS LEOPARDINUS (Schlegel). See HELICOPS LEPRIEURII Duméril and Bibron COTYPES

HELICOPS LEPRIEURII Duméril and Bibron COTYPES
= HELICOPS LEOPARDINUS (Schlegel)

2100. Two. Cayenne. Exch. Paris Mus. through A. A. Duméril. 1865.

ERP. GÉN., **7**, 1854, p. 750, pl. 48.
Old soft specimen.

HELMINTHOPIS BEUI Amaral PARATYPES

16702, 17842–43. Three. Grounds of Instituto Butantan, São Paulo, Brazil. A. Amaral. A. Amaral. 1922–23.

PROC. N. ENG. ZOÖL. CLUB, **9**, 1924, p. 29.
Fine fresh material.

HELMINTHOPHIS EMUNCTUS (Garman). See IDIOTYPHLOPS EMUNCTUS Garman HOLOTYPE

HELMINTHOPHIS INCERTUS Amaral HOLOTYPE

17846. One. Surinam. F. W. Cragin (probably). Wyman Collection.

PROC. N. ENG. ZOÖL. CLUB, **9**, 1924, p. 29.
Old and faded; there is a little uncertainty about the data.

HELMINTHOPHIS PRAEOCULARIS Amaral HOLOTYPE

17960. One. Honda, Colombia. H^{no}. Nicéforo Maria. H^{no} Nicéforo Maria. 1924.

PROC. N. ENG. ZOÖL. CLUB, **9**, 1924, p. 28.
A good specimen.

HELMINTHOPHIS WILDERI (Garman). See TYPHLOPS WILDERI Garman COTYPES

HEMIDACTYLUS EXSUL Barbour and Cole HOLOTYPE

7039. One. Progreso, Yucatan. L. J. Cole. A. Agassiz. 1904.

BULL. MUS. COMP. ZOÖL., **50**, 1906, p. 148.
Improbable, we admit, but this seems to be a valid species. The generic identity is certain.

HEMIDACTYLUS FLAVIVIRIDIS Rüppell COTYPE

21927. One. "Massoa" (sic) = Massowa, Abyssinia. E. C. Ehrenberg. Exch. Berlin Mus. 1925.

NEUE WIRBELTH. FAUNA ABYSS., REPT., 1835, p. 18, pl. 6, fig. 2.
Faded but in good condition.

HEMIDACTYLUS FRENATUS (Schlegel) Duméril and Bibron. See HEMIDACTYLUS LONGICEPS Cope HOLOTYPE

HEMIDACTYLUS HEXASPIS Cope COTYPES
= HEMIDACTYLUS MABOUIA (Moreau de Jonnes)

5732. Two. Madagascar. Capt. Webb Goodhue. Peabody Mus., Salem. 1886.

PROC. ACAD. NAT. SCI. PHILA., 1860, p. 320.
Old soft specimens.

HEMIDACTYLUS ITURIENSIS Schmidt PARATYPE

12559. One. Medje, Belgian, Congo. Lang-Chapin Exped. Exch. Amer. Mus. Nat. Hist. 1919.

BULL. AMER. MUS. NAT. HIST., **39**, 1919, p. 455, pl. 15, fig. 2, pl. 16, text fig. 7.
A fine example.

HEMIDACTYLUS LONGICEPS Cope HOLOTYPE
= HEMIDACTYLUS FRENATUS (Schlegel) Duméril and Bibron

5730. One. Manila, Philippine Is. W. T. Cheever. Peabody Mus., Salem. 1886.

PROC. ACAD. NAT. SCI. PHILA., 1868, p. 320.
An old macerated example but quite identifiable.

HEMIDACTYLUS MABOUIA (Moreau de Jonnes). See HEMIDACTYLUS HEXASPIS Cope COTYPES

HEMIDACTYLUS PERSIMILIS Barbour and Loveridge
HOLOTYPE AND PARATYPES

24041. ♂. Dar es Salaam, Tanganyika Territory. A. Loveridge. T. Barbour. 1927.
24042–49. Six. Dar es Salaam, Tanganyika Territory. A. Loveridge. T. Barbour. 1927.
22978–81. Four. Morogoro, Tanganyika Territory. A. Loveridge. T. Barbour. 1924.
22982–85. Four. Lumbo, Portuguese East Africa. A. Loveridge. T. Barbour. 1924.
22986. One. Frere Town, Kenya Colony. A. Loveridge. T. Barbour. 1924.
24040. One. Bagilo, Uluguru Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1924.

MEM. MUS. COMP. ZOÖL., **50**, 1928, p. 140, pl. 4, figs. 1 and 3.
The series includes numerous eggs. The Dar es Salaam series are in excellent condition, many of the others are tailless.

HERPELE OCHROCEPHALA (Cope). See COECILIA SABOGAE Barbour
COTYPES

HETERODON MADAGASCARIENSIS Duméril and Bibron COTYPES
= LIOHETERODON MADAGASCARIENSIS (Duméril and Bibron)

2202. Two. Madagascar. Exch. Paris Mus. through A. A. Duméril. 1865.

ERP. GÉN., **7**, 1854, p. 776.
Excellent specimens considering their age.

HOLARCHUS NESIOTIS Barbour HOLOTYPE

7107. One. Ting-an, Hainan Id. Alan Owston. T. Barbour. 1907.

BULL. MUS. COMP. ZOÖL., **51**, 1908, pp. 318–319.
A fine example, fully adult.

HOLARCHUS PERKINSI Taylor HOLOTYPE

25725. One. Culion, Culion Id., Calamaines Group, Philippine Is. G. A. Perkins. T. Barbour. 1927.

PHIL. JOUR. SCI., **26**, 1925, p. 108.
Excellent condition.

HOLBROOKIA ELEGANS Bocourt. See HOLBROOKIA THERMORPHILA Barbour
HOLOTYPE AND PARATYPES

HOLBROOKIA MACULATA CAMPI Schmidt PARATYPE

15679. One. 6–10 mi. N. W. of Adamana, Apache Co., Arizona, U.S.A. C. L. Camp. Exch. Amer. Mus. Nat. Hist. 1921.

AMER. MUS. NOVIT., **22**, 1921, p. 1.
A good example of this rather delicately established race.

HOLBROOKIA PULCHRA Schmidt PARATYPE

15678. One. Miller Cañon, Huachuca Mts., Arizona, U. S. A. R. D. Camp. Exch. Amer. Mus. Nat. Hist. 1921.

AMER. MUS. NOVIT., **22**, 1921, p. 1.
A fine specimen.

HOLBROOKIA THERMOPHILA Barbour HOLOTYPE AND PARATYPES
= HOLBROOKIA ELEGANS Bocourt

14281. One. San José de Guaymas, Mexico. W. W. Brown. J. E. Thayer. 1908.
14283–91. Nine. San José de Guaymas, Mexico. W. W. Brown. J. E. Thayer. 1908.

PROC. N. ENG. ZOÖL. CLUB, **7**, 1921, p. 79.
The series of paratypes of this synonym, as well as the type, are in a good state of preservation.

HOPLOPHRYNE ROGERSI Barbour and Loveridge
HOLOTYPE AND PARATYPES

13814. ♂. Amani, Usambara Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.
13815–16. Two. Amani, Usambara Mts., Tanganyika Territory. A. Loveridge. T Barbour. 1927.

MEM. MUS. COMP. ZOÖL., **50**, 1928, p. 258, pl. 2, fig. 5.
Excellent condition.

HOPLOPHRYNE ULUGURUENSIS Barbour and Loveridge
HOLOTYPE AND PARATYPES

13766. ♂. Nyange, Uluguru Mts., Tanganyika Territory A. Loveridge. T. Barbour. 1927.
13767–89. Twenty-three. Nyange, Uluguru Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.
13796–97. Two. Bagilo, Uluguru Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.
13798–802. Five. Nyingwa, Uluguru Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.

13804–12. Nine. Vituri, Uluguru Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.

Also various developmental stages of eggs and tadpoles.

MEM. MUS. COMP. ZOÖL., **50**, 1928, p. 254, pl. 2, figs. 3 and 4.

Excellent condition.

HYDROPHIS ABBREVIATUS Jan = LAPEMYS HARDWICKII Gray HOLOTYPE

20647. One. Manila Harbor, Philippine Is. Capt. W. T. Cheever. Peabody Mus., Salem. 1925.

ICON. GÉN., LIVR. 40, 1872, pl. 4, fig. 2.

A good specimen recently found at Salem by Dr. Malcolm Smith. The history of the specimen, however, is perfectly clear.

HYDROPHIS SEMPERI Garman HOLOTYPE

4352. Lake Taal, Luzon, Philippine Is. Carl Semper. Carl Semper. 1877.

BULL. MUS. COMP. ZOÖL., **8**, 1881, p. 85.

A small soft specimen. A second example of this interesting reptile has recently been added to the collection.

HYDROSAURUS WEBERI Barbour HOLOTYPE AND PARATYPE

7505. ♂. Weeda, Halmahera, Dutch E. I. T. Barbour. T. Barbour. 1910.

7506. ♀. Weeda, Halmahera, Dutch E. I. T. Barbour. T. Barbour. 1910.

PROC. BIOL. SOC. WASH., **24**, 1911, p. 20.

The type is a giant adult male, the form very distinct from Schlosser's *amboinensis*.

HYLA AMBOINENSIS Horst. See HYLA KAMPENI Barbour HOLOTYPE

HYLA BAMBUSICOLA Barbour nom. nov. See HYLA MONTICOLA Barbour HOLOTYPE

2553. One. Washan Pass (10,500 feet) near Ta-chien-lu, West Szechuan, China. W. R. Zappey. J. E. Thayer. 1909.

COPEIA, **88**, 1920, p. 98.

First described as *Hyla monticola*, a name preoccupied by one inconspicuously proposed by Cope for a Costa Rican species. The species is distinct and peculiar. The type in fair preservation.

HYLA BAUDINII DOLOMEDES Barbour HOLOTYPE
= HYLA PHAEOTA Cope

8539. One. Rio Esnápe, Sambú Valley, E. Panama. Barbour and Brooks. T. Barbour. 1922.

OCC. PAPERS MUS. ZOÖL. UNIV. MICH., **129**, 1923, p. 11.

We have not seen the type of *Hyla gabbi* and there may be some questions about this allocation; there may also be a Chocoan subspecies of the Costa Rican *gabbi*.

HYLA BOULENGERI (Cope). See HYLA LANCASTERI Barbour HOLOTYPE

HYLA CHICA Noble PARATYPE

4897. One. Maselina Creek, Nicaragua. Halter and Mannhardt. Exch. Am. Mus. Nat. Hist. 1916.

BULL. AMER. MUS. NAT. HIST., **38**, 1918, p. 335.

A rather hardened little froglet. The status of this form is questionable. The paratype, which may not be conspecific with the type, is apparently *Eleutherodactylus gularis*.

HYLA CIRCUMDATA (Cope). See HYPSIBOAS CIRCUMDATA Cope COTYPE

HYLA CRYPTOMELAN (Cope). See CENTROTELMA CRYPTOMELAN Cope HOLOTYPE

HYLA CUSPIDATA Lutz COTYPE

12889. One. Rio de Janeiro, Brazil. Adolpho Lutz. Exch. Mich. Univ. Mus. 1927.

TRABALHO DO INST. OSWALDO CRUZ, 1926, p. 6.

HYLA DOMINICENSIS Tschudi. See TRACHYCEPHALUS OVATUS Cope HOLOTYPE

HYLA FUNEREA (Cope). See SCYTOPIS FUNEREUS Cope COTYPE

HYLA HAYII Barbour HOLOTYPE

2513. One. Petropolis, Brazil. C. L. Hay and T. Barbour. T. Barbour. 1908.

PROC. N. ENG. ZOÖL. CLUB, **4**, 1909, p. 51, pl. 5, lower fig.

This species is represented by the type only, which unfortunately has gotten badly hardened.

HYLA HEILPRINI Noble PARATYPE

9351. One. La Bracita, Santo Domingo. G. K. Noble. Exch. Amer. Mus. Nat. Hist. 1922.

AMER. MUS. NOVIT., **61**, 1923, p. 1.
A fine example of a lovely species.

HYLA KAMPENI Barbour = HYLA AMBOINENSIS Horst HOLOTYPE

2433. One. Wahaai, Ceram Id., Dutch E. I. T. Barbour. T. Barbour. 1907.

BULL. MUS. COMP. ZOÖL., **51**, 1908, p. 324.
Several forms are probably confused with *Hyla amboinensis*, and it is not improbable that with more adequate material a Ceram race will be recognized. The type is unfortunately somewhat hardened.

HYLA LANCASTERI Barbour = HYLA BOULENGERI (Cope) HOLOTYPE

13062. One. Peralta (500 m.) Costa Rica. C. R. Lankester. C. R. Lankester. 1927.

PROC. N. ENG. ZOÖL. CLUB, **10**, 1928, p. 31, pl. 4, fig. 2.
Excellent condition.

HYLA MARIANAE Dunn HOLOTYPE AND PARATYPES

11122. One. Spaldings, Clarendon Parish (2,900 ft.), Jamaica. E. R. Dunn. T. Barbour. 1925.

11276–82. Seven. Spaldings, Clarendon Parish (2,900 ft.), Jamaica. E. R. Dunn. T. Barbour. 1925.

PROC. BOSTON SOC. NAT. HIST., **38**, 1926, p. 129.
A well-preserved series comprising type, paratypes and many tadpoles.

HYLA MONTICOLA Barbour HOLOTYPE
= HYLA BAMBUSICOLA Barbour nom. nov.

2553. One. Washan Pass, 10,500 ft., near Ta-chien-lu, West Szechuan, China. W. R. Zappey. J. E. Thayer. 1909.

MEM. MUS. COMP. ZOÖL., **40**, 1912, p. 127.

HYLA (HYLELLA) OUWENSII Barbour HOLOTYPE

2434. One. Pom, Jobi Id., Dutch New Guinea. T. Barbour. T. Barbour. 1906.

BULL. MUS. COMP. ZOÖL., **51**, 1908, p. 325.
A beautiful little frog, the type in fair preservation.

HYLA PHAEOTA Cope. See HYLA BAUDINII DOLOMEDES Barbour HOLOTYPE

HYLA POLYTAENIA Cope COTYPES

1544. Two. Amazonas, Brazil. George Sceva. Thayer Exped. 1864.

PROC. AMER. PHIL. SOC., **11**, 1869, p. 164.
Somewhat dried and faded.

HYLA REGILLA Baird and Girard COTYPE

2149. One. Puget Sound. Exch. U. S. Nat. Mus. 1879.

PROC. ACAD. NAT. SCI. PHILA., 1852, p. 174.
An old and rather soft specimen.

HYLA REGILLA Baird and Girard. See HYLA REGILLA LATICEPS Cope COTYPE

HYLA REGILLA LATICEPS Cope COTYPE
= HYLA REGILLA Baird and Girard

3729. One. Cape St. Lucas, Lower California. John Xantus. Exch. U. S. Nat. Mus. 1916.

BULL. U. S. NAT. MUS., **34**, 1889, p. 359.
A very fair specimen.

HYLA RICHARDII Baird = HYLA VERSICOLOR Le Conte HOLOTYPE

2128. One. Mt. Auburn, Cambridge, Massachusetts, U. S. A. Peabody Museum, Salem. 1886.

PROC. ACAD. NAT. SCI. PHILA., 1854, p. 60.
A tiny young, which Baird mistook for a valid species.

HYLA RUBRA Daudin. See CYTOPIS ALLENII Cope.

HYLA VALENTONI Cope MS.?

7663. One. Peru. James Orton. Exch. Acad. Nat. Sci. Phila. 1921.

Name perhaps never published.

HYLA VARIABILIS Boulenger COTYPE

2606. One. Cali, Colombia. W. F. H. Rosenberg. T. Barbour. ?1910.

ANN. MAG. NAT. HIST., (6), **17**, 1896, p. 20.
A good example.

HYLA VERSICOLOR Le Conte. See HYLA RICHARDII Baird HOLOTYPE

HYLA WILDERI Dunn HOLOTYPE AND PARATYPES

10500. One. Moneague, Jamaica. H. H. and I. W. Wilder. H. H. and I. W. Wilder. 1925.

10562–75. Fourteen. Moneague, Jamaica. H. H. and I. W. Wilder. H. H. and I. W. Wilder. 1925.

10576–85. Ten. Mandeville, Jamaica. A. E. Wight. Mus. Exped. 1909. 1925.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1925, p. 161.

We owe this beautiful type and a series of paratypes to the generosity of Professor and Mrs. Wilder.

HYLODES BRICENI Boulenger COTYPES
= ELEUTHERODACTYLUS BRICENI (Boulenger)

3888, 7600. Two. Merida, Venezuela. M. Briceno. T. Barbour. 1915.

ANN. MAG. NAT. HIST., (7), **11**, 1903, p. 481.

Very fair specimens.

HYLODES MACULATUS Agassiz COTYPES
= PSEUDACRIS NIGRITA LeConte

38. Two. Lake Superior. Louis Agassiz. Mus. Exped. 1862.

LAKE SUPERIOR, 1850, p. 378, pl. 6, figs. 1–3.

Somewhat dried and shrunken.

HYLODES VARIANS Gundlach and Peters COTYPE
= ELEUTHERODACTYLUS VARIANS (Gundlach and Peters)

11621. One. Cuba. J. Gundlach. Exch. Berlin Mus. 1925.

MONATSBER. AKAD. WISS. BERLIN, 1864, p. 390.

A good specimen but faded.

HYLODES WHYMPERI Boulenger COTYPES
= ELEUTHERODACTYLUS WHYMPERI (Boulenger)

3021–22. Two. Pichincha, Ecuador (11,000 to 12,000 ft.). Edward Whymper. Purchased. 1913.

ANN. MAG. NAT. HIST., (5), **9**, 1882, p. 465.

These specimens were not specifically mentioned by Boulenger as being in his hands but nevertheless were undoubtedly before him when the species was described. They were received marked as types when Whymper's private collection was purchased after his death. Our specimens, no doubt, represented the share returned to him after Boulenger studied the material and selected a series for the British Museum.

HYLORANA LEPTOGLOSSA Cope = RANA LEPTOGLOSSA (Cope) COTYPES

1588. Three. Rangoon, Burma. W. Theobald. Purchased.

PROC. ACAD. NAT. SCI. PHILA., 1868, p. 140.
Three soft but very fair specimens.

HYLORANA SUBCOERULEA Cope COTYPE
= RANA ERYTHRAEA (Schlegel)

1591. One ♂. Rangoon, Burma. W. Theobald. Purchased.

PROC. ACAD. NAT. SCI. PHILA., 1868, p. 139.
A rather poor specimen.

HYMENOCHIRUS CURTIPES Noble PARATYPE

6615. One. Zambi, Belgian Congo. Lang-Chapin Exped. Exch. Amer. Mus. Nat. Hist. 1920.

BULL. AMER. MUS. NAT. HIST., **49**, 1924, p. 155.
A good specimen.

HYNOBIUS KIMURAI Dunn HOLOTYPE

8546. One. Hondo, Mt. Heizan, near Kyoto, Japan. H. H. Wilder and Dr. Kimura. Exch. H. H. Wilder. 1922.

PROC. CALIF. ACAD. SCI., (4), **12**, 1923, p. 27.
A fine example. Another type which we owe to Dr. Wilder's kindness through Dr. E. R. Dunn.

HYNOBIUS NAEVIUS (Schlegel). See SALAMANDRA NAEVIA Schlegel. COTYPE

HYPEROLIUS BAYONI (Boulenger). See RAPPIA BAYONI Boulenger COTYPE

HYPEROLIUS FESTIVUS Barbour and Loveridge HOLOTYPE AND PARATYPES

12018. One. Plantation No. 3, Du River, Liberia. G. M. Allen. Harvard Liberian Exped. 1926.

12019–20. Two. Plantation No. 3, Du River, Liberia. G. M. Allen. Harvard Liberian Exped. 1926.

PROC. N. ENG. ZOÖL. CLUB, **10**, 1927, p. 17.
Excellent condition.

HYPEROLIUS MARIAE Barbour and Loveridge HOLOTYPE AND PARATYPES

13267. One. Derema, Usambara Mountains, Tanganyika Territory. Mrs. A. Loveridge. T. Barbour. 1927.

13262–66
13268–76 } Twenty-one. Derema, Usambara Mountains, Tanganyika Territory. Mrs. A. Loveridge. T. Barbour. 1927.

MEM. MUS. COMP. ZOÖL., **50**, 1928, p. 217, pl. 3, fig. 1.
Excellent condition.

HYPSIBOAS CIRCUMDATA Cope COTYPE
= HYLA CIRCUMDATA (Cope)

1508. One. Rio Janeiro, Brazil. Thayer Exped. Thayer Exped. 1864–65.

PROC. AMER. PHIL. SOC., **11**, 1870, p. 555.
A good example of a handsome and easily distinguished species.

HYPSIGLENA OCHRORHYNCHA Cope COTYPE

9503. One. Cape St. Lucas, Lower California, Mexico. John Xantus. Exch. U. S. Nat. Mus.

PROC. ACAD. NAT. SCI. PHILA., 1860, p. 246.
A rather soft specimen.

HYPSIRHYNCHUS FEROX Cope. See HYPSIRHYNCHUS SCALARIS Cope HOLOTYPE

HYPSIRHYNCHUS SCALARIS Cope HOLOTYPE
= HYPSIRHYNCHUS FEROX Cope

3611. One. Jeremie, Haiti. D. F. Weinland. Purchased. 1859.

PROC. ACAD. NAT. SCI. PHILA., 1862, p. 72.
A good specimen.

IALTRIS DORSALIS Cope. See IALTRIS VULTUOSA Cope COTYPES

IALTRIS VULTUOSA Cope = IALTRIS DORSALIS Cope COTYPES

3600. Two. Jeremie, Haiti. D. F. Weinland. Purchased. 1859.

PROC. ACAD. NAT. SCI. PHILA., 1862, p. 73.
Two large but somewhat shrunken specimens.

ICHTHYOPHIS GLANDULOSUS Taylor PARATYPES

14001–03. Three. Abung-abung, Basilan Id., Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **22**, 1923, p. 516, pl. 3, figs. 4 and 5.
Excellent condition.

IDIOTYPHLOPS EMUNCTUS Garman HOLOTYPE
= HELMINTHOPHIS EMUNCTUS (Garman)

3971. One. Panama. McNeil. F. W. Putnam. 1876.

MEM. MUS. COMP. ZOÖL., **8**, 1883, p. 3.
A good example.

ILIODISCUS SEMIPALMATUS Miranda Ribeiro COTYPE
= CYCLORHAMPHUS ASPER Werner

10750. One. Alto da Serra, São Paulo, Brazil. A. de Miranda Ribeiro. A. de Miranda Ribeiro. 1925.

REV. MUSEU PAULISTA, **12**, 2, 1920, p. 269, fig.
The alteration in the synonymy of this frog is made as a result of Lutz's (1929) revision of the genus CYCLORHAMPHUS.

INSULARIS WRIGHTI Taylor HOLOTYPE

26301. One. Thumb Peak, nr. Iwalig, Palawan Id., Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **26**, 1925, p. 103.
Excellent condition.

IXALUS JAPONICUS Hallowell COTYPE
= POLYPEDATES JAPONICUS (Hallowell)

2602. One. Amami-o-shima Id., Riu Kiu Is. William Stimpson. Exch. U. S. Nat. Mus. 1910.

PROC. ACAD. NAT. SCI., PHILA., 1860, p. 501.
An old soft specimen, entirely serviceable, however.

IXALUS PALLIDIPES Barbour HOLOTYPE
= PHILAUTUS PALLIDIPES (Barbour)

2442. One. Mt. Pangerango, Tjibodas, Java. T. Barbour. T. Barbour. 1906–07.

PROC. BIOL. SOC. WASH., **21**, 1908, p. 190.
Now somewhat dried.

JAPALURA FLAVICEPS Barbour and Dunn HOLOTYPE AND PARATYPES

12469. One. Tung R., W. Szechuan, China. W. R. Zappey. J. E. Thayer. 1908.

12470–73. Four. Tung R., W. Szechuan, China. W. R. Zappey. J. E. Thayer. 1908.

PROC. N. ENG. ZOÖL. CLUB, **7**, 1919, p. 16.
The type and a small series of paratypes are somewhat soft and desquamated.

KALOULA BOREALIS (Barbour). See CACOPOIDES BOREALIS Barbour
GENOTYPE AND HOLOTYPE

KALOULA KALINGENSIS Taylor PARATYPE

14474. One. Balbalan, Kalinga, Luzon, Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **21**, 1922, p. 178, pl. 3, figs. 1 and 2.
Excellent condition.

KALOULA RIGIDA Taylor PARATYPES

14506–08. Three. Balbalan, Kalinga, Luzon, Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **21**, 1922, p. 176, pl. 3, figs. 5 and 6.
Excellent condition.

KALOULA VERRUCOSA (Boulenger). See CALLULA VERRUCOSA Boulenger
COTYPES

KINOSTERNON BAURII Garman COTYPES

1563. Two. Key West, Florida, U. S. A., J. E. Mills.
4380. One. Key West, Florida, U. S. A., S. Garman. Blake Exped. 1878.
4718. Five. Key West, Florida, U. S. A., R. M. Kemp. R. M. Kemp. 1881.
4050. One. "Cuba." "F. Poey." Purchased.

BULL. ESSEX INST., **23**, 1891, p. 141.
A nice, well-preserved series of a species which, needless to say, was never native to Cuba.

LACERTA DERJUGINI Nikolsky COTYPE

22200. One. Mechelripsch, Tschernomorskaja. S. Tzarewsky. Exch. St. Petersburg Mus. 1926.

ANN. MUS. ZOÖL. ACAD SCI. ST. PETERSBOURG, **3**, 1898, p. 284.
An excellent example.

LACERTA LEPIDA PATER (Lataste). See LACERTA OCELLATA PATER Lataste
COTYPES

LACERTA MURALIS BEDRIAGAE (Camerano). See LACERTA MURALIS var. j. Duméril and Bibron. COTYPE

LACERTA MURALIS var. i. Duméril and Bibron COTYPE
= LACERTA MURALIS SERPA Rafinesque

2126. One. Sicily. Exch. Paris Mus. through A. A. Duméril. 1865.

ERP. GÉN., **5**, 1839, p. 234.
Another good specimen to which the remarks made under the following species equally apply.

LACERTA MURALIS var. j. Duméril and Bibron COTYPE
= LACERTA MURALIS BEDRIAGAE (Camerano)

2127. One. Corsica. Exch. Paris Mus. through A. A. Duméril. 1865.

ERP. GÉN., **4**, 1837, p. 234.
A fine specimen. It is a little difficult to determine just where these belong according to Boulenger's rearrangement.

LACERTA MURALIS SERPA Rafinesque. See LACERTA MURALIS var. i. Duméril and Bibron COTYPE

LACERTA OCELLATA PATER Lataste COTYPES
= LACERTA LEPIDA PATER (Lataste)

4613. Two. Edough, Algeria. F. Lataste. Exch. F. Lataste. 1879.

LE NATURALISTE, 1880, p. 306.
One large and one small specimen.

LACHESIS INSULARIS Amaral PARATYPES
= BOTHROPS INSULARIS (Amaral)

16696–97. Two. Ilha de Queimada Grande, São Paulo, Brazil. A. Amaral. A. Amaral. 1922.

AN. DAS MEM. INST. DE BUTANTAN, **1**, 1, 1921, p. 62, pl. 3–4.
Beautiful specimens.

LAMPROPELTIS GETULUS BROOKSI Barbour HOLOTYPE

12456. One. 14 mi. S. W. Florida City, Florida, U. S. A. W. S. Brooks. T. Barbour. 1919.

PROC. N. ENG. ZOÖL. CLUB, **7**, 1919, p. 2.
A fine adult of this well-marked race.

LAMPROPELTIS MEXICANA (Garman). See OPHIOBOLUS TRIANGULUS *var.* MEXICANUS Garman COTYPES

LAMPROPELTIS THAYERI Loveridge HOLOTYPE

19551. One. Miquihuana, Tamaulipas, Mexico. W. W. Brown. J. E. Thayer. 1924.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1924, p. 137.
Excellent specimen.

LAPEMYS HARDWICKII Gray. See HYDROPHIS ABBREVIATUS Jan. HOLOTYPE

LATHROGECKO XANTHOSTIGMA Noble HOLOTYPE

11658. One. Zent, near Puerto Limon, Costa Rica. H. S. Blair. H. S. Blair. 1915.

PROC. BIOL. SOC. WASH., **29**, 1916, p. 87.
A fine large adult.

LEIMADOPHIS ALLENI Dunn HOLOTYPE AND PARATYPE

12861. One. La Gonave Id., Haiti. G. M. Allen. T. Barbour. 1919.
12860. One. La Gonave Id., Haiti. G. M. Allen. T. Barbour. 1919.

PROC. N. ENG. ZOÖL. CLUB, **7**, 1920, p. 40.
Good examples.

LEIMADOPHIS ANDICOLUS Barbour HOLOTYPE AND PARATYPE
= TACHYMENIS PERUVIANA Wiegmann

10987. One. Huispang, Peru. E. C. Erdis. Yale-Peruvian Exped. 1914.
10986. One. Huispang, Peru. E. C. Erdis. Yale-Peruvian Exped. 1914.

PROC. BIOL. SOC. WASH., **28**, 1915, p. 150.
Good examples.

LEIMADOPHIS ANDREAE ANDREAE (R. and L.). See DROMICUS CUBENSIS Garman COTYPES

LEIMADOPHIS ANDREAE NEBULATUS (Barbour). See LEIMADOPHIS NEBULATUS Barbour HOLOTYPE

LEIMADOPHIS ANDREAE ORIENTALIS Barbour and Ramsden HOLOTYPE AND PARATYPES

11726. One. Guantanamo, Cuba. C. T. Ramsden. C. T. Ramsden. 1916.

11723–25. Three. Guantanamo, Cuba. C. T. Ramsden. C. T. Ramsden. 1916.

MEM. MUS. COMP. ZOÖL., **47**, 1919, p. 197.
Good specimens.

LEIMADOPHIS BOULENGERI Barbour COTYPES

6135–37. Five. Castries, St. Lucia, Br. W. I. S. Garman. Blake Exped. 1879.

MEM. MUS. COMP. ZOÖL., **44**, 1914, p. 339.
Fair specimens in most part.

LEIMADOPHIS MARIAE Barbour COTYPES

6138. Two. Marie Galante, Fr. W. I. W. B. Richardson. Purchased. 1886.

MEM. MUS. COMP. ZOÖL., **44**, 1914, p. 340.
Fair specimens.

LEIMADOPHIS NEBULATUS Barbour HOLOTYPE
= LEIMADOPHIS ANDREAE NEBULATUS (Barbour)

11092. One. Sierra de Caballos, Isle of Pines, Cuba. W. S. Brooks, V. J. Rodriquez and T. Barbour. T. Barbour. 1915.

ANN. CARNEGIE MUS. **10**, 1916, p. 305.
A good fresh example.

LEIMADOPHIS PARVIFRONS PARVIFRONS (Cope). See DROMICUS PARVIFRONS Cope COTYPES

LEIMADOPHIS PARVIFRONS NIGER Dunn HOLOTYPE AND PARATYPE

7833. Two. La Vega, Santo Domingo. A. H. Verrill. T. Barbour. 1910.

PROC. N. ENG. ZOÖL. CLUB, **7**, 1920, p. 39.
A large but somewhat recently dried example.

LEIMADOPHIS TYPHLUS (Linné). See LIOPHIS ELAEOIDES Griffin. PARATYPE

LEIOCEPHALUS ARENARIUS Barbour (nec Tschudi) HOLOTYPE AND PARATYPES
= LEIOCEPHALUS PSAMMODROMUS Barbour

11948. One. Bastion Cay, Turks Is., Br. W. I. L. A. Mowbray. L. A. Mowbray. 1916.

11949–53. Five. Bastion Cay, Turks Is., Br. W. I. L. A. Mowbray. L. A. Mowbray. 1916.

PROC. BIOL. SOC. WASH., **29**, 1916, p. 217.
The type and paratypes given a preoccupied name which was later corrected in Copeia (**85**, 1920, p. 73).

LEIOCEPHALUS BARAHONENSIS Schmidt PARATYPE

14350. One. Barahona, Santo Domingo. John L. Phillips. Exch. Amer. Mus. Nat. Hist. 1921.

BULL. AMER. MUS. NAT. HIST., **44**, 1921, p. 15, fig. 12.
A fair example.

LEIOCEPHALUS BEATANUS Noble PARATYPE

17737. One. Beata Id., Santo Domingo. G. K. Noble. Exch. Amer. Mus. Nat. Hist. 1922.

AMER. MUS. NOVIT., **64**, 1923, p. 3.
An excellent example.

LEIOCEPHALUS LOXOGRAMMUS (Cope). See LIOCEPHALUS LOXOGRAMMUS Cope COTYPE

LEIOCEPHALUS MACROPUS (Cope). See LIOCEPHALUS MACROPUS Cope COTYPE

LEIOCEPHALUS MELANOCHLORUS Cope COTYPES

3598. Nine. Jeremie, Haiti. D. F. Weinland. Purchased. 1859.

PROC. ACAD. NAT. SCI. PHILA., 1862, p. 184.
Large cotypes but softened somewhat.

LEIOCEPHALUS PERSONATUS (Cope). See LIOCEPHALUS PERSONATUS Cope COTYPES

LEIOCEPHALUS PSAMMODROMUS Barbour. See LEIOCEPHALUS ARENARIUS Barbour (non Tschudi). HOLOTYPE AND PARATYPES

LEIOCEPHALUS RAVICEPS (Cope). See LIOCEPHALUS RAVICEPS Cope COTYPE

LEIOCEPHALUS SEMILINEATUS Dunn HOLOTYPE

12848. One. Thomazeau, Haiti. G. M. Allen. T. Barbour. 1919.

PROC. N. ENG. ZOÖL. CLUB, **7**, 1920, p. 33.
A good specimen.

Leiocephalus varius (Garman). See Liocephalus varius Garman. COTYPES

Leiocephalus vinculum Cochran HOLOTYPE AND PARATYPES

25435. One. Pte á Raquette, Gonave Id., Haiti. W. J. Eyerdam. T. Barbour. 1927.

25436–37. Two. Pte á Raquette, Gonave Id., Haiti. W. J. Eyerdam. T. Barbour. 1927.

PROC. BIOL. SOC. WASH., **41**, 1928, p. 54.
Good condition.

Leiolepis belliana annamensis (Malcolm Smith). See Leiolepis belliana var. annamensis Malcolm Smith PARATYPE

Leiolepisma pullum Barbour HOLOTYPE
= Leiolopisma pullum (Barbour)

7486. One. Humboldt's Bay, Dutch New Guinea. T. Barbour. T. Barbour. 1910.

PROC. BIOL. SOC. WASH., **24**, 1911, p. 15.
A fine example.

Leiolopisma aeratum (Garman). See Lygosoma aeratum Garman

Leiolopisma atromaculatum (Garman). See Lygosoma atromaculatum Garman COTYPES

Leiolopisma austro-caledonicum atropunctatum (Roux). See Lygosoma austro-caledonicum atropunctatum Roux COTYPES

Leiolopisma austro-caledonicum dorsovittatum (Roux). See Lygosoma austro-caledonicum dorsovittatum Roux COTYPE

Leiolopisma austro-caledonicum festivum (Roux). See Lygosoma austro-caledonicum festivum Roux COTYPES

Leiolopisma barbouri Stejneger HOLOTYPE

7261. One. Yunnan-fu, Yunnan, China. J. Graham. T. Barbour. 1906.

JOUR. WASH. ACAD. SCI., **15**, 1925, p. 150.

LEIOLOPISMA GUICHENOTI (Duméril and Bibron). See LYGOSOMA GUICHENOTI Duméril and Bibron — COTYPE

LEIOLOPISMA MACCOOEYI (Ramsay and Douglas Ogilby). See LYGOSOMA MACCOOEYI Ramsay and Douglas Ogilby — COTYPE

LEIOLOPISMA PULLUM (Barbour). See LEIOLEPISMA PULLUM Barbour — HOLOTYPE

LEIOLOPISMA SCHMIDTI Barbour — HOLOTYPE

7966. One. Washan Mts., W. Szechuan, China. W. R. Zappey. J. E. Thayer. 1908.

COPEIA, **165**, 1927, p. 95.
Good condition.

LEIOLOPISMA SPINAURIS (Malcolm Smith). See LYGOSOMA (LEIOLOPISMA) SPINAURIS Malcolm Smith — PARATYPES

LEIOLOPISMA VITTIGERUM KRONFANUM (Malcolm Smith). See LYGOSOMA VITTIGERUM KRONFANUM Malcolm Smith — PARATYPE

LEPIDOBLEPHARIS BARBOURI Noble — HOLOTYPE AND PARATYPES

14044. One. Perico, Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.

14359–410. Two hundred. Bellavista, Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.

ANN. N. Y. ACAD. SCI., **29**, 1921, p. 133.
A fine series, type and paratypes, very well preserved for the most part.

LEPIDODACTYLUS AUREOLINEATUS Taylor — PARATYPE

26107. One. Bunawan, Agusan Prov., Mindanao Id., Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **10**, 1915, p. 97.
Excellent condition.

LEPIDODACTYLUS DIVERGENS Taylor — PARATYPES

26086–91. Six. Great and Little Govenen Id., Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **13**, 1918, p. 242, pl. 1, figs. 1–3.
Excellent condition.

LEPIDODACTYLUS LUGUBRIS (Duméril and Bibron). See PEROPUS ROSEUS Cope COTYPES

LEPIDODACTYLUS MANNI Schmidt HOLOTYPE

16880. Suene, Viti Levu, Fiji Is. W. M. Mann. Mus. Exped. 1916.

COPEIA, **116**, 1923, p. 51.
A good specimen.

LEPIDODACTYLUS NAUJANENSIS Taylor PARATYPES

20164–65, 26106. Three. Lake Naujan, Mindoro, Philippine Is. E. H. Taylor, Exch. Carnegie Mus. 1925, and T. Barbour. 1927.

PHIL. JOUR. SCI., **14**, 1919, p. 113.
Very good example.

LEPIDOPHYMA FLAVOMACULATUM OBSCURUM Barbour HOLOTYPE AND PARATYPE

17747. One. Chillibrillo R., Panama Republic. Zetek and Shannon. Zetek and Shannon. 1923.

18861. One. Barro Colorado Id., Gatun Lake, Canal Zone. Zetek and Shannon. Zetek and Shannon. 1924.

PROC. N. ENG. ZOÖL. CLUB, **9**, 1924, p. 10.
Two splendid specimens.

LEPIDOSTERNON LATIFRONTALE Boulenger COTYPE

10783. One. Asunçion, Paraguay. J. Bohls. Exch. British Mus. 1915.

ANN. MAG. NAT. HIST., (6), **13**, 1894, p. 345.
A fine specimen.

LEPOSOMA SOUTHI Ruthven and Gaige PARATYPE

18915. One. Progreso, Chiriqui Province, Panama Republic. H. T. Gaige. Exch. Univ. Mich. Mus. 1924.

OCC. PAPERS MUS. ZOÖL. UNIV. MICH., **147**, 1924, p. 1.
A good specimen. Many subsequent examples have been received from various stations in Panama.

LEPTOBRACHIUM BOETTGERI Boulenger COTYPES
= MEGALOPHRYS BOETTGERI (Boulenger)

3790. One. Kwatun, N. W. Fokien, China. J. D. LaTouche. Exch. British Mus. 1915.

PROC. ZOÖL. SOC. LOND., 1899, p. 171, pl. 19, fig. 3.
An excellent example.

LEPTODACTYLUS BOLIVIANUS (Boulenger). See LEPTODACTYLUS INSULARUM Barbour — COTYPES

LEPTODACTYLUS CURTUS Barbour and Noble — HOLOTYPE AND PARATYPES

5281. One. Bellavista, Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.

5269 etc. Seven. Bellavista, Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.

5282 and 5284. Two. Perico, Bellavista, Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.

BULL. MUS. COMP. ZOÖL., **58**, 1920, p. 405.
A fine series of type and well-preserved paratypes.

LEPTODACTYLUS INOPTATUS Barbour — HOLOTYPE
= ELEUTHERODACTYLUS INOPTATUS (Barbour)

3087. One. Diquini, Haiti. W. M. Mann. Mus. Exped. 1913.

MEM. MUS. COMP. ZOÖL., **44**, 1914, p. 252.
A giant example, well preserved.

LEPTODACTYLUS INSULARUM Barbour — COTYPES
= LEPTODACTYLUS BOLIVIANUS (Boulenger)

2424. One. San Miguel Id., Bay of Panama. W. W. Brown. J. E. Thayer. 1904.

6901–02. Two. San Miguel Id., Bay of Panama. W. W. Brown. J. E. Thayer. 1904.

2444. Six. Saboga Id., Bay of Panama. W. W. Brown. J. E. Thayer. 1904.

BULL. MUS. COMP. ZOÖL., **46**, 1906, p. 228.
Good examples only somewhat hardened.

LEPTODACTYLUS NANUS Müller — COTYPES

8841–42, 11680. Three. Rio Humboldt, Santa Catharina, Brazil. Purchased from Karl Fritsche. T. Barbour. 1925.

BLÄTTER F. AQUARIEN U. TERRARIENKUNDE, **33**, 1922, p. 168.
A tiny species, well-preserved specimens.

LEPTODACTYLUS RUBIDO Cope — COTYPE

4780. One. Moyabamba, Peru. J. Orton. Exch. Acad. Nat. Sci. Phila. 1918.

PROC. ACAD. NAT. SCI. PHILA., 1874, p. 128.
A soft cotype from the series in the Philadelphia Academy.

LEPTODACTYLUS VALIDUS Garman COTYPES

2185. Forty-two. Kingston, St. Vincent, Br. W. I. S. Garman. Blake Exped. 1879.

BULL. ESSEX INST., **19**, 1887, p. 14.
A good series of this form which is probably at most a race of *L. caliginosus*.

LEPTODRYMAS CLARKI Amaral HOLOTYPE

20207. One. Tela, Toloa Creek, Honduras Republic. H. Clark. United Fruit Co. 1925.

BULL. ANTIVEN. INST. AMER., **1**, 1927, p. 28, fig. 10.
Excellent condition.

LEPTOPELIS AUBRYI (A. Duméril). See NYCTIBATES LAEVIS Barbour HOLOTYPE

LEPTOPELIS PARKERI Barbour and Loveridge HOLOTYPE

13597. One. Vituri, Uluguru Mountains, Tanganyika Territory. A. Loveridge. T. Barbour. 1927.

MEM. MUS. COMP. ZOÖL., **50**, 1928, p. 236, pl. 4, figs. 9 and 10.
Excellent condition.

LEPTOPELIS ULUGURUENSIS Barbour and Loveridge HOLOTYPE AND PARATYPES

13586. One. Nyange, Uluguru Mountains, Tanganyika Territory. A. Loveridge. T. Barbour. 1927.
13587–96. Twenty-one. Vituri, Uluguru Mountains, Tanganyika Territory. A. Loveridge. T. Barbour. 1927.

MEM. MUS. COMP. ZOÖL., **50**, 1928, p. 235, pl. 3, fig. 3.
Excellent condition.

LEPTOTYPHLOPS BLANFORDI (Boulenger). See GLAUCONIA CARLTONI Barbour COTYPES

LEPTOTYPHLOPS DULCIS (Baird and Girard). See STENOSTOMA RUBELLUM Garman HOLOTYPE

LEPTOTYPHLOPS HUMILIS (Baird and Girard). See STENOSTOMA TENUICULUM Garman HOLOTYPE

LEPTOTYPHLOPS MYOPICA (Garman). See STENOSTOMA MYOPICUM Garman COTYPES

LEPTOPHIS OCCIDENTALIS INSULARIS Barbour HOLOTYPE

6985. One. Gorgona Id., Colombia. W. W. Brown. J. E. Thayer. 1904.

BULL. MUS. COMP. ZOÖL., **46**, 1905, p. 101.
In poor condition.

LEPTOTYPHLOPS PHILLIPSI Barbour HOLOTYPE AND PARATYPES

9650. One. Petra, Arabia. J. C. Phillips and W. M. Mann. J. C. Phillips. 1914.

9638–44, 9646–49. Ten. Petra, Arabia. J. C. Phillips and W. M. Mann. J. C. Phillips. 1914.

PROC. N. ENG. ZOÖL. CLUB, **5**, 1914, p. 87, figs.
A nice suite of this tiny species.

LETHEOBIA PALLIDA Cope HOLOTYPE AND GENOTYPE
= TYPHLOPS PALLIDUS (Cope)

5723. One. Zanzibar, E. Africa. C. Cooke. Peabody Mus., Salem. 1886.

PROC. ACAD. NAT. SCI. PHILA., 1868, p. 322.
A very fair specimen, "found in a well."

LIASIS CLARKI Barbour HOLOTYPE

9600. One. Mer Id., Murray Is., Torres Straits. H. L. Clark. Carnegie Inst. Exped. 1914.

PROC. BIOL. SOC. WASH., **27**, 1914, p. 202.
A fine half-grown example of a very peculiar species.

LIMNODYTES ULCEROSUS Boettger COTYPES
= MANTIDACTYLUS ULCEROSUS (Boettger)

9331–34. Four. Nossi-bé, Madagascar. A. Stumpff. Exch. Senck. Mus. 1883.

2164. One. Nossi-bé, Madagascar. Bought from Nat. Hist. Inst. Linnaea. 1887.

ZOÖL. ANZ., 1880, p. 282.
In rather poor condition. The Naturhistorisches Institut "Linnaea," managed by a Dr. August Müller, bought surplus material from many voyagers for some years and resold to museums. In this way a few cotypes were fortuitously secured.

LIOCEPHALUS LOXOGRAMMUS Cope COTYPE
= LEIOCEPHALUS LOXOGRAMMUS (Cope)

10931. One. Rum Cay, Bahamas, Br. W. I. C. H. Thomas. Exch. U. S. Nat. Mus. 1915.

PROC. U. S. NAT. MUS., **10**, 1887, p. 437.
Only a fair example.

LIOCEPHALUS MACROPUS Cope COTYPE
= LEIOCEPHALUS MACROPUS (Cope)

10930. One. Eastern Cuba. Charles Wright. Exch. U. S. Nat. Mus. 1915.

PROC. ACAD. NAT. SCI. PHILA., 1862, p. 184.
A rather poor example.

LIOCEPHALUS PERSONATUS Cope COTYPES
= LEIOCEPHALUS PERSONATUS (Cope)

3615. Two. Jeremie, Haiti. D. F. Weinland. Purchased. 1859.

PROC. ACAD. NAT. SCI. PHILA., 1862, p. 182.
In fair condition.

LIOCEPHALUS RAVICEPS Cope COTYPE
= LEIOCEPHALUS RAVICEPS (Cope)

10928. One. Eastern Cuba. Charles Wright. Exch. U. S. Nat. Mus. 1915.

PROC. ACAD. NAT. SCI. PHILA., 1862, p. 183.
Soft and tailless.

LIOCEPHALUS VARIUS Garman COTYPES
= LEIOCEPHALUS VARIUS (Garman)

6023. Three. Grand Cayman Id., Br. W. I. W. B. Richardson. Purchased. 1887.

PROC. AMER. PHIL. SOC., **24**, 1887, p. 274.
Good specimens.

LIODYTES ALLENI (Garman). See HELICOPS ALLENI Garman
HOLOTYPE

LIOHETERODON MADAGASCARIENSIS (Duméril and Bibron). See HETERODON MADAGASCARIENSIS Duméril and Bibron COTYPES

LIOLAEMUS ALTICOLOR Barbour COTYPES

7287. Two. Tiaguanaco, Bolivia 12,500 ft. T. Barbour. T. Barbour. 1909.

PROC. N. ENG. ZOÖL CLUB, **4**, 1909, p. 50, pl. 5, upper fig.
A gaudy little lizard, caught during a flurry of snow.

LIOLAEMUS CHILENSIS (Duméril and Bibron). See PROCTOTRETUS CHILENSIS var. B. Duméril and Bibron COTYPE

LIOLAEMUS HATCHERI Stejneger PARATYPES

11828–29. Two. Terr Sta. Cruz, S. Argentina. J. B. Hatcher. Exch. Princeton Univ. 1916.

REP. PRINCETON EXPED. TO PATAGONIA, **3**, 2, 1909, p. 218.
Good examples.

LIOLAEMUS PICTUS (Duméril and Bibron). See PROCTOTRETUS PICTUS var. B. Duméril and Bibron COTYPE

LIOLAEMUS SIMONSII Boulenger COTYPES

14351–52. Two. Uyuni, Bolivia, 3,660 m. P. O. Simons. Exch. British Mus. 1921.

ANN. MAG. NAT. HIST., (7), **10**, 1902, p. 398.
Good specimens of a fine big species.

LIOLAEMUS TENUIS (Duméril and Bibron). See PROCTOTRETUS TENUIS Duméril and Bibron COTYPE

LIOLAEMUS WIEGMANNII (Duméril and Bibron). See PROCTOTRETUS WIEGMANNII Duméril and Bibron COTYPE

LIOLEPIS BELLIANA var. ANNAMENSIS Malcolm Smith PARATYPE
= LEIOLEPIS BELLIANA ANNAMENSIS (Malcolm Smith)

16656. One. Tour Cham, S. Annam. Malcolm Smith. T. Barbour. 1922.

PROC. ZOÖL. SOC. LOND., 1921, p. 429.
A fine example of a handsome form.

LIOPHIS ELAEOIDES Griffin PARATYPE
= LEIMADOPHIS TYPHLUS (Linné)

11860. One. Santa Crux de la Sierra, Bolivia. J. Steinbach. Exch. Carnegie Mus. 1916.

MEM. CARNEGIE MUS., **7**, 1915, p. 187.
A poor specimen but no question as to Amaral's allocation to synonymy.

LIOPHIS PERSIMILIS Cope

436. Rio de Janeiro, Brazil. Thayer Exped. Thayer Exped. 1864–65.

PROC. ACAD. NAT. SCI. PHILA., 1868, p. 308.
"Type in Museum of Comparative Zoölogy, Thayer Expedition." Not yet found; evidently a number from the old catalogue.

LITHODYTES PODICIFERUS Cope COTYPE
= ELEUTHERODACTYLUS PODICIFERUS (Cope)

11841. One. Pico Blanco, Costa Rica. Gabb. Exch. U.S.Nat.Mus. 1926.

JOUR. ACAD. NAT. SCI. PHILA., **8**, 1876, p. 107, pl. 23, fig. 9.
Good condition.

LYGODACTYLUS OCELLATUS Roux COTYPE

20976. One. Pretoria District, S. Africa. Breyer. Exch. Zoöl. Mus. Amsterdam. 1925.

ZOÖL. JAHRB., SYST., **25**, 1907, p. 406.
A fair specimen.

LYGODACTYLUS ROBUSTUS Boettger COTYPES

21938–39. Two. Anharimbela, S. Madagascar. A. Voeltzkow. Exch. Zoöl. Mus. Berlin. 1925.

IN VOELTZKOW'S "REISE OST-AFR.," **3**, 1913, p. 289.
In rather poor condition.

LOPHIOHYLA PIPERATA Miranda Ribeiro COTYPE

10775. One. Rio de Janeiro, Brazil. A. de Miranda Ribeiro. A. de Miranda Ribeiro. 1925.

BOL. MUS. NAC. RIO DE JANEIRO, **1**, 1923, p. 5.
A small and somewhat shriveled specimen.

LYGODACTYLUS CAPENSIS MOSSAMBICA Loveridge COTYPES

13622–13626, 18543–48. Eleven. Lumbo, Mozambique, Portuguese East Africa. A. Loveridge. T. Barbour. 1920 and 1924.

PROC. ZOÖL. SOC. LOND., 1920, p. 135.
A good race and good specimens.

LYGODACTYLUS STRONGI Barbour and Loveridge HOLOTYPE

22578. One. Firestone Plantation, Du River, Liberia. G. M. Allen. Harvard Liberian Exped. 1926.

PROC. N. ENG. ZOÖL. CLUB, **10**, 1927, p. 18.
Excellent condition.

LYGODACTYLUS THOMENSIS Peters COTYPE

21940. One. São Thomé Id., W. Africa. Greef. Exch. Zoöl. Mus. Berlin. 1925.

MONATSBER. AKAD. WISS. BERLIN, 1880, p. 795, fig. 1. of pl. opp. p. 798.
Good example.

LYGODACTYLUS TUBERIFER Boettger COTYPES

21941–43. Three. Tulear, S. W. Madagascar. A. Voeltzkow. Exch. Zoöl. Mus. Berlin. 1925.

IN VOELTZKOW'S "REISE OST-AFR.," **3**, 1913, p. 288, pl. 25, figs. 5 and 6.
Better than most of this material.

LYGOSOMA AERATUM Garman HOLOTYPE
= LEIOLOPISMA AERATUM (Garman)

6476. One. Cooktown, Australia. E. A. Olive. Great Barrier Reef Exped. 1896.

BULL. MUS. COMP. ZOÖL., **39**, 1901, p. 7.
A fine example, like all of Olive's collecting.

LYGOSOMA (OMOLEPIDA) ANTONIORUM Malcolm Smith PARATYPES
= OMOLEPIDA ANTONIORUM (Malcolm Smith)

25373–80. Eight. Lélogama, South Timor. Malcolm Smith. T. Barbour. 1927.

PROC. ZOÖL. SOC. LOND., 1927, p. 216, text fig. 3.
Excellent condition.

LYGOSOMA ARUNDELII Garman HOLOTYPE
= EMOIA ARUNDELII (Garman)

6463. One. Clipperton Id. John Arundel. A. Agassiz. 1898.

PROC. N. ENG. ZOÖL. CLUB, **1**, 1899, p. 59.
A beautiful little creature.

LYGOSOMA ATROMACULATUM Garman COTYPES
= LEIOLOPISMA ATROMACULATUM (Garman)

6475. Two. Queensland, Australia. E. A. Olive. Great Barrier Reef Exped. 1896.

6478. Three. Queensland, Australia. E. A. Olive. Great Barrier Reef Exped. 1896.

BULL. MUS. COMP. ZOÖL., **39**, 1901, p. 8.
In good condition.

L(YGOSOMA) AUSTRO-CALEDONICUM ATROPUNCTATUM Roux COTYPES
= LEIOLOPISMA AUSTRO-CALEDONICUM ATROPUNCTATUM (Roux)

9288. One. Lifu, Loyalty Is. Sarasin and Roux. Exch. Basel Mus. 1922.

15970. One. Tionaka Valley, New Caledonia. Sarasin and Roux. Exch. Basel Mus. 1914.

15971. One. Yaté, New Caledonia. Sarasin and Roux. Exch. Basel Mus. 1922.

19593. One. Oubatché, New Caledonia. Sarasin and Roux. Exch. Basel Mus. 1924.
19594. One. Netché Maré, Loyalty Is. Sarasin and Roux. Exch. Basel Mus. 1924.
19595. One. Yaté, New Caledonia. Sarasin and Roux. Exch. Basel Mus. 1924.

NOVA CALEDONIA, ZOÖL., **1**, 1913, p. 117.
Six cotypes of this beautiful race, well preserved.

LYGOSOMA AUSTRO-CALEDONICUM DORSOVITTATUM Roux COTYPES
= LEIOLOPISMA AUSTRO-CALEDONICUM DORSOVITTATUM (Roux)

9287, 15973–74, 19598. Four. Néché Maré, Loyalty Is. Sarasin and Roux. Exch. Basel Mus. 1914, 1922, 1924.
19596. One. Hienghiene, New Caledonia. Sarasin and Roux. Exch. Basel Mus. 1924.
19597. One. Mt. Kanale, New Caledonia. Sarasin and Roux. Exch. Basel Mus. 1924.

NOVA CALEDONIA, ZOÖL., **1**, 1913, p. 118.
Another pretty race, good examples, received on several occasions by exchange.

LYGOSOMA AUSTRO-CALEDONICUM FESTIVUM Roux COTYPES
= LEIOLOPISMA AUSTRO-CALEDONICUM FESTIVUM (Roux)

19598. One. Valley Ngoi, Ile Grande, New Caledonia. Sarasin and Roux. Exch. Basel Mus. 1911.
19599. One. Ignambi, Foom, New Caledonia. Sarasin and Roux. Exch. Basel Mus. 1911.

NOVA CALEDONIA, ZOÖL., **1**, 1913, p. 120.
Good examples of another apparently distinct subspecies.

LYGOSOMA GUICHENOTI Duméril and Bibron COTYPE
= LEIOLOPISMA GUICHENOTI (Duméril and Bibron)

2153. One. Australia. Exch. Paris. Mus. through A. A. Duméril. 1865.

ERP. GÉN., **5**, 1839, p. 713.
An old soft specimen, easily identifiable.

LYGOSOMA MACCOOEYI Ramsay and Douglas Ogilby COTYPE
= LEIOLOPISMA MACCOOEYI (Ramsay and Douglas Ogilby)

6304. One. Brawlin near Cootamundra, N.S.W. H. J. McCooey. Exch. Australian Mus. 1890.

REC. AUSTRALIAN MUS., **1**, 1890, p. 8.
In good condition.

LYGOSOMA MONILIGERA Duméril and Bibron — COTYPES
= EGERNIA WHITII Lacépéde

2133. Two. Australia. Exch. Paris Mus. through A. A. Duméril. 1865.

ERP. GÉN., **5**, 1839, p. 736.
In very good shape considering age.

LYSOSOMA SAMOENSE LOYALTIENSIS Roux — COTYPE
= EMOIA SAMOENSE LOYALTIENSIS (Roux)

19610. One. Nétché Mare, Médoa, Loyalty Is. Sarasin and Roux. Exch. Basel Mus. 1924.

NOVA CALEDONIA, ZOÖL., **1**, 1913, p. 110.
A good specimen of this apparently valid geographic subspecies.

LYGOSOMA (LEIOLOPISMA) SPINAURIS Malcolm Smith — PARATYPES
= LEIOLOPISMA SPINAURIS (Malcolm Smith)

25392–93. Two. Djamplong, South Timor. Malcolm Smith. T. Barbour. 1927.

25394. One. Lélogama, South Timor. Malcolm Smith. T. Barbour. 1927.

PROC. ZOÖL. SOC. LOND., 1927, p. 218, text fig. 4.
Excellent condition.

LYGOSOMA VITTIGERUM KRONFANUM Malcolm Smith — PARATYPE
= LEIOLOPISMA VITTIGERUM KRONFANUM (Malcolm Smith)

16669. One. Langbian Plateau, Daban, S. Annam. Malcolm Smith. T. Barbour. 1922.

JOUR. NAT. HIST. SOC., SIAM, **4**, 1922, p. 208.
Excellent condition.

MABUYA ACUTILABRIS Peters — COTYPES

21037–38. Two. Neu Barmen, W. Africa. Hahn. Exch. Zoöl. Mus. Berlin. 1925.

MONATSBER. AKAD. WISS. BERLIN, 1862, p. 19.
In very fair condition, only a bit too soft.

MABUYA BONTOCENSIS Taylor — PARATYPES

26286–88. Three. Bontoc Subprovince, Mountain Province, Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **22**, 1923, p. 532.
Excellent condition.

MABUYA DOMINICANA Garman COTYPES

6049. Three. Dominica, Br. W. I. S. Garman. Blake Exped. 1879.

BULL. ESSEX INST., **19**, 1887, p. 52.
Good examples.

MABUYA ENGLEI Taylor TYPE AND PARATYPES

26289. One. Saub, Cotobato Coast, Philippine Is. E. H. Taylor. T. Barbour. 1927.
26290–26300. Eleven. Saub, Cotobato Coast, Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **26**, 1925, p. 101.
Excellent condition.

MABUYA LUCIAE Garman HOLOTYPE

6046. One. St. Lucia, Br. W. I. S. Garman. Blake Exped. 1879.

BULL. ESSEX INST., **19**, 1887, p. 51.
A good specimen.

MABUYA NITIDA Garman = MABUYA SLOANII (Daudin) COTYPES

3617. One. Santo Domingo. D. F. Weinland. Gray Fund. 1859.
6050. One. San Juan, Porto Rico. S. Garman. Blake Exped. 1879.
6052. Two. San Juan, Porto Rico. Aug. Stahl. Purchased. 1880.

BULL. ESSEX INST., **19**, 1887, p. 51.
These are treasures, now that the mongoose has spread so widely. They are in good shape.

MABUYA PERGRAVIS Barbour PARATYPE

14294. One. Old Providence Id., Bahamas, Br. W. I. Albatross Exped. Exch. U. S. Nat. Mus. 1921.

PROC. N. ENG. ZOÖL. CLUB, **7**, 1921, p. 85.
A fine example.

MABUYA SLOANII (Daudin). See MABUYA NITIDA Garman COTYPE

MABUYA SUDANENSIS Schmidt PARATYPE

13359. One. Garamba, Belgian Congo. Lang-Chapin Exped. Exch. Amer. Mus. Nat. Hist. 1919.

BULL. AMER. MUS. NAT. HIST., **39**, 1919, p. 536, pl. 25.
A good specimen.

MABUIA VARIA *var.* LONGILOBA Methuen and Hewitt COTYPE
= MABUYA VARIA VARIA (Peters).

22478. One. Narudas Sud, Gt. Karas Mts., S. W. Africa. P. A. Methuen. Exch. Transvaal Mus. 1926.

ANN. TRANSVAAL MUS., **4**, 1914, p. 142.

We have recently considered that this form cannot be admitted to subspecific rank though apparently a well-marked and constant phase in its type locality.

MABUYA VARIA VARIA (Peters). See MABUIA VARIA *var.* LONGILOBA Methuen and Hewitt PARATYPE

MACMAHONIA APOROSCELIS (Alcock and Finn). See SCAPTIRA APOROSCELIS Alcock and Finn COTYPE

MACROPHOLIDUS RUTHVENI Noble HOLOTYPE AND PARATYPE

14041. One. Cordillera forming boundary of Depts. of Piura and Cajamarca, Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.

14043. One. Chongollape, Peru. G. K. Noble. Purchased in Peru. 1916.

ANN. N. Y. ACAD. SCI., **29**, 1921, p. 138.

One good and one small and rather poor specimen.

MALACOCLEMMYS OCULIFERA Baur HOLOTYPE
= GRAPTEMYS PSEUDOGEOGRAPHICA OCULIFERA (Baur)

6430. One. Near New Orleans, Louisiana, U. S. A. George Baur. George Baur. 1891.

SCIENCE, SER. 1, **16**, 1890, p. 262.

An adult in excellent condition. A fine distinct subspecies.

MANCUS MACROLEPIS Cope COTYPE
= CHAMAESAURA MACROLEPIS (Cope)

17736. One. Zululand, S. Africa. S. A. Grant. Exch. Acad. Nat. Sci. Phila. 1923.

PROC. ACAD. NAT. SCI. PHILA., 1862, p. 339.

A fair example from the small suite in Philadelphia.

MANOLEPIS PUTNAMI (Jan.) See DROMICUS PUTNAMI Jan. HOLOTYPE

MANTELLA EBENAUI Boettger COTYPES

2165. One. Nossi-bé, Madagascar. A. Müller coll. Purchased from Naturh. Inst. Linnea. 1887.

9329–30. Two. Nossi-bé, Madagascar. C. Ebenau and A. Stumpff. Exch. Senck. Mus. 1923.

ZOÖL. ANZ., 1880, p. 281.
Good specimens.

MANTELLA LAEVIGATA Methuen and Hewitt COTYPE

10815. One. Folohy, east of Lake Alaotra, E. Madagascar. Herschell-Chauvin. Exch. Transvaal Mus. 1925.

ANN. TRANSVAAL MUS., **4**, 1913, p. 57.
A beautiful little beast.

MANTELLA PULCHRA Parker PARATYPE

11645. One. Antsihanaka, Madagascar. W. F. H. Rosenberg coll. Exch. British Mus. 1925.

ANN. MAG. NAT. HIST., (9), **16**, 1925, p. 393.
Another gem of this bizarre and beautiful genus.

MANTIDACTYLUS LUTEUS Methuen and Hewitt PARATYPE

10801. One. Folohy, east of Lake Alaotra, E. Madagascar. Herschell-Chauvin. Exch. Transvaal Mus. 1925.

ANN. TRANSVAAL MUS., **4**, 1913, p. 51.
A good example.

MANTIDACTYLUS ULCEROSUS (Boettger). See LIMNODYTES ULCEROSUS Boettger COTYPES

MEGALIXALUS ULUGURUENSIS Barbour and Loveridge
HOLOTYPE AND PARATYPES

13311. One. Vituri, Uluguru Mountains, Tanganyika Territory. A. Loveridge. T. Barbour. 1927.
13312–20. Fifteen. Vituri, Uluguru Mountains, Tanganyika Territory. A. Loveridge. T. Barbour. 1927.
13321. One. Bumbuli, Usambara Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.
13368. One. Derema, Usambara Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.

MEM. MUS. COMP. ZOÖL., **50**, 1928, p. 231, pl. 3, fig. 2.
Excellent condition.

MEGALOPHRYS BOETTGERI (Boulenger). See LEPTOBRACHIUM BOETTGERI Boulenger COTYPES

MEGALOPHRYS INTERMEDIUS Malcolm Smith PARATYPES

8776–77. Two. Langbian Plateau, Annam. Malcolm Smith. T. Barbour. 1922.

PROC. ZOÖL. SOC., LOND., 1921, p. 439.

MICRIXALUS DIMINUTIVA TAYLOR PARATYPES

14603–04. Two. Near Pasananka, Zamboanga, Mindanao, Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **21**, 1922, p. 267, pl. 1, figs. 3, 4; pl. 2, figs. 2, 3.
Excellent condition.

MICRIXALUS TORRENTIS Malcolm Smith COTYPES
= RANA TORRENTIS (Malcolm Smith)

9439–40. Two. Five Finger Mt., Hainan at 1,000 metres. Malcolm Smith. T. Barbour. 1924.

JOUR. NAT. HIST. SOC. SIAM, **6**, 1923, p. 209.

MICROHYLA BERDMOREI Blyth. See CALLULA NATATRIX Cope COTYPES

MICROHYLA EREMITA Barbour HOLOTYPE AND PARATYPE

5114. One. Nanking, China. Cora D. Reeves. Exch. Univ. Mich. Mus. 1919.

5115. One. Nanking, China. Cora D. Reeves. Exch. Univ. Mich. Mus. 1919.

OCC. PAPERS MUS. ZOÖL. UNIV. MICH., **76**, 1920, p. 3.
A beautiful pair which we have through the great generosity of the University of Michigan Museum. Dr. Ruthven very kindly let the type stay in Cambridge.

MICROHYLA HAINANENSIS Barbour COTYPES

2435. Four. Mt. Wuchi, Hainan Id. A. Owston's Collectors. T. Barbour. 1906.

BULL. MUS. COMP. ZOÖL., **51**, 1908, p. 322.
Soft but colors brilliant.

MICROLOPHUS LESSONII Duméril and Bibron COTYPE
= TROPIDURUS PERUVIANUS (Lesson)

2181. One. Peru. Exch. Paris Mus. through A. A. Duméril. 1865.

ERP. GÉN., **4**, 1837, p. 336.
Rather shabby.

MICRURUS CORALLINUS (Wied). See ELAPS COLOMBIANUS Griffin PARATYPE

MICRURUS DUNNI Barbour HOLOTYPE

16304. One. Ancon, Canal Zone. Barbour and Brooks. T. Barbour. 1922.

OCC. PAPERS MUS. ZOÖL. UNIV. MICH., **129**, 1923, p. 15.

MICRURUS FULVIUS BARBOURI Schmidt HOLOTYPE

13658. One. Paradise Key, Florida. T Barbour. T. Barbour. 1920.

BULL. ANTIVENIN. INST. AMER., **2**, 1928, p. 64.
Excellent condition.

MICRURUS NIGROCINCTUS RUATANUS (Günther). See ELAPS RUATANUS Günther COTYPE

MICRURUS STEWARTI Amaral HOLOTYPE

24924. One. Bruja Mts., inland from Nombre de Dios, Panama Republic. Capt. T. H. Stewart. Capt. T. H. Stewart. 1927.

BULL. ANTIVENIN. INST. AMER., **1**, 1928, p. 100.
Excellent condition.

MOLGE ITALICA Peracca = TRITURUS ITALICUS (Peracca) COTYPES

7366–67. Two. Portenza di Basilicata, Italy. M. G. Peracca. Exch. British Mus. 1921.

BULL. MUS. TORINO, **13**, 1898, p. 317.
A fine pair.

MONOPELTIS LEONHARDI Werner COTYPE

21030. One. Gobabis, Kalahari, S. W. Africa. Müller. Exch. Zoöl. Mus. Berlin. 1925.

JENA. DENSCHR. MED. GES., **16**, 1910, p. 318.
A fine lizard.

MORELIA ARGUS Duméril and Bibron COTYPE
= PYTHON SPILOTES (Lacépède)

2200. One. Australia. Exch. Paris Mus. through A. A. Duméril. 1865.

ERP. GÉN., **6**, 1844, p. 385.
A very fine example considering over a generation of years on exhibition.

NANNOBATRACHUS BEDDOMII Boulenger COTYPES

2905–07. Three. Tinnevelly, Malabar, India. Col. Beddome. Exch. British Mus. 1912.

CAT. BATR. SAL. BRIT. MUS., 1882, p. 470.
Three fine little frogs.

NARUDASIA FESTIVA Methuen and Hewitt PARATYPE

14209. One. Gt. Karas Mts., S. W. Africa. Dr. H. H. W. Pearson. Exch. Transvaal Mus. 1920.

ANN. TRANSVAAL MUS., **4**, 1913, p. 127, pl. 14, fig. 1.
A good example.

NATRIX AEQUIFASCIATA Barbour COTYPES

7101. Two. Mt. Wuchi, Hainan Id. A. Owston's Collectors. T. Barbour. 1906.

BULL. MUS. COMP. ZOÖL., **51**, 1908, p. 317.
Two good but rather young specimens. Stejneger considers the species distinct.

NATRIX BARBOURI Taylor PARATYPE

25612. One. Balbalan, Kalinga, Luzon, Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **21**, 1922, p. 291.
Excellent condition.

NATRIX MELANOCEPHALA (Werner). See TROPIDONOTUS (MACROPOPHIS) MELANOCEPHALUS Werner PARATYPE

NATRIX TAXISPILOTA (Holbrook). See TROPIDONOTUS TAXISPILOTUS Holbrook COTYPES

NECTES OBSCURUS Barbour COTYPES
= BUFO FULIGINOSUS Mocquard

2396. Two. Sarawak, Borneo. W. T. Hornaday. T. Barbour. 1903.

PROC. BIOL. SOC. WASH., **17**, 1904, p. 51.
Two good specimens.

NECTODACTYLUS SPINULOSUS Miranda Ribeiro COTYPE

10151. One. Humboldt, Sta. Catharina, Brazil. A. de Miranda Ribeiro. Exch. Nat. Mus. of Rio de Janeiro. 1924.

BOL. MUS. NAC. RIO DE JANEIRO, **1**, 3, 1924, p. 256.
A fine specimen.

NECTURUS PUNCTATUS Gibbes COTYPE

1553. One. Santee River, Carolina, U. S. A. L. R. Gibbes. L. R. Gibbes.

JOUR. BOSTON SOC. NAT. HIST., **6**, 1853, p. 369.

Eviscerated and sewn up. In fair condition. There are other specimens from Gibbes in Washington.

NOROPS YUCATANICUS Cole and Barbour COTYPES

7036. Three. Chichén-Itzá, Yucatan. L. J. Cole. A. Agassiz. 1905.

BULL. MUS. COMP. ZOÖL., **50**, 1906, p. 149.

A good little series.

NUCRAS KILOSAE Loveridge PARATYPES

18298. One skull. Kilosa, Tanganyika Territory. A. Loveridge. T. Barbour. 1924.

18592. One. Tindiga, Kilosa, Tanganyika Territory. A. Loveridge. T. Barbour. 1924.

PROC. ZOÖL. SOC. LOND., 1922, p. 314.

A nice specimen.

NYCTIBATES LAEVIS Barbour HOLOTYPE
= LEPTOPELIS AUBRYI (A. Duméril)

2629. One. Efulen, Kribi, Cameroons. George Schwab. Exch. Univ. Mich. Mus. 1908.

BULL. MUS. COMP. ZOÖL., **54**, 1911, p. 131, pl. 2, fig. 1.

According to Noble *laevis* should stand as a synonym. The type is in good condition.

NYCTIMANTIS PAPUA Boulenger COTYPE
= NYCTIMYSTES PAPUA (Boulenger)

12838. One. Mt. Victoria, Owen Stanley Range, New Guinea. British Ornithological Union Expedition. Exch. British Mus. 1927.

ANN. MAG. NAT. HIST., (6), **19**, p. 12, pl. 1, fig. 5.

Good condition.

NYCTIMYSTES PAPUA (Boulenger). See NYCTIMANTIS PAPUA Boulenger COTYPE

OEDIPINA ALFAROI Dunn HOLOTYPE AND PARATYPE
= OEDIPUS ALFAROI (Dunn)

6938. One. Zent, Costa Rica. E. R. Dunn. T. Barbour. 1920.

6944. One. Zent, Costa Rica. E. R. Dunn. T. Barbour. 1920.

PROC. BIOL. SOC. WASH., **34**, 1921, p. 144.
Good examples of what proves to be a rare species.

OEDIPUS ALFAROI (Dunn). See OEDIPINA ALFAROI Dunn
HOLOTYPE AND PARATYPE

OEDIPUS CEPHALICUS (Cope). See SPELERPES ORIZABENSIS Blatchley.
COTYPE

OEDIPUS COLONNEUS Dunn HOLOTYPE

9406. ♀. La Loma, W. Panama. Dunn and Duryea. T. Barbour. 1923

FIELD MUS. NAT. HIST., ZOÖL. SER., **12**, 1924, p. 96.
A beautiful form.

OEDIPUS COMPLEX Dunn HOLOTYPE

9408. One Las Cascadas Cocoa Plantation near Gamboa, Canal Zone. Snyder, with W. S. Brooks and E. Wigglesworth. T. Barbour. 1923.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1924, p. 94.
A small but brilliant little salamander.

OEDIPUS NASALIS Dunn PARATYPE

10730–31. Two. Mountains west of San Pedro, Honduras, at 4,500 feet alt. K. P. Schmidt and Leon L. Walters. Exch. Field Mus. Chicago. 1925.

FIELD MUS. NAT. HIST., ZOÖL., SER., **12**, 1924, p. 97.

OEDIPUS REX Dunn PARATYPES

7368–69. Two. Sierra Sta. Elena (near Tecpan), Guatemala, 9,500 ft. C. M. Barbour. Exch. Field Mus. Nat. Hist. 1921.

PROC. BIOL. SOC. WASH., **34**, 1921, p. 143.
An abundant form, recently rediscovered. Good examples.

OEDIPUS TOWNSENDI Dunn HOLOTYPE AND PARATYPES

8017. One. Cerro de los Estropajos near Jalapa, Mexico. E. R. Dunn and P. Townsend. T. Barbour. 1921.
8018. One. Guerrero, Hildalgo, Mexico. W. M. Mann. Mus. Exped. 1916.

8019–21. Three. Cerro de los Estropajos near Jalapa, Mexico. E. R. Dunn and P. Townsend. T. Barbour. 1921.

PROC. BIOL. SOC. WASH., **35**, 1922, p. 5.
A well-preserved series of a tiny species.

OEDURA MAYERI Garman = OEDURA TRYONI De Vis COTYPES

6471. Four. Queensland, Australia. A. G. Mayer and E. A. Olive. Great Barrier Reef Exped. 1896.

BULL. MUS. COMP. ZOÖL., **39**, 1901, p. 3.
Good examples.

OEDURA TRYONI De Vis. See OEDURA MAYERI Garman COTYPES

OEDURA VERRILLII Cope
Australia.

PROC. ACAD. NAT. SCI. PHILA., 1860, p. 319.
Cope says type M.C.Z., No. 724: which refers to the old catalogue. The specimen has not yet been found.

OMOLEPIDA ANTONIORUM (Malcolm Smith). See LYGOSOMA (OMOLEPIDA) ANTONIORUM Malcolm Smith. PARATYPES

ONYCHOCEPHALUS MOSSAMBICUS Peters COTYPE
= TYPHLOPS MOSSAMBICUS (Peters)

21007. One. Mozambique. W. Peters. Exch. Zoöl. Mus. Berlin. 1925.

MONATSBER. AKAD. WISS. BERLIN, 1854, p. 621.
In good condition.

ONYCHOCEPHALUS TRILOBUS Peters COTYPE
= TYPHLOPS FORNASINII Bianconi

21006. One. Inhambane, Portuguese East Africa. W. Peters. Exch. Zoöl. Mus. Berlin. 1925.

MONATSBER. AKAD. WISS. BERLIN, 1854, p. 621.
In very good condition.

OOEIDOZYGA CELEBENSIS Malcolm Smith PARATYPES

13483–92. Nineteen. Djikoro, Mt. Bonthain, S. Celebes. Malcolm Smith. T. Barbour. 1927.

PROC. ZOÖL. SOC. LOND., 1927, p. 204.

OOEIDOZYGA SEMIPALMATA Malcolm Smith PARATYPES

13493–98. Seventeen. Djikoro, Mt. Bonthain, S. Celebes. Malcolm Smith. T. Barbour. 1927.

13499. Fifteen. Lowah, S. Celebes. Malcolm Smith. T. Barbour. 1927.

PROC. ZOÖL. SOC. LOND., 1927, p. 203.

OPHIOBOLUS TRIANGULUS *var.* MEXICANUS Garman COTYPES
= LAMPROPELTIS MEXICANA (Garman)

4652–53. Two. San Luis Potosi, Mexico. Edward Palmer. A. Agassiz. 1879.

MEM. MUS. COMP. ZOÖL., **8**, 1883, p. 66.
Old alcoholic skins with heads and tails left in. Colours vivid.

OPHIS SUSPECTUS (Cope). See XENODON SUSPECTUS Cope HOLOTYPE

OREOPHRYNE FUSCA (Mocquard). See CHAPERINA BEYERI Taylor PARATYPES

OREOPHRYNE JEFFERSONIANA Dunn PARATYPE

14861. One. Komodo Id., Dutch East Indies. Burden-Dunn Exped. T. Barbour. 1928.

AM. MUS. NOVIT., **315**, 1928, p. 3.
Good condition.

OREOPHRYNE QUELCHII Boulenger COTYPES
= OREOPHRYNELLA QUELCHII (Boulenger)

3500–02. Three. Mt. Roraima, British Guiana. J. J. Quelch and F. McConnell. Exch. British Mus. 1914.

ANN. MAG. NAT. HIST., (6), **15**, 1895, p. 521.
Fine little toads.

OREOPHRYNELLA QUELCHII (Boulenger). See OREOPHRYNE QUELCHII Boulenger. COTYPES

OREOSAURUS LACERTUS Stejneger PARATYPES

12085–87. Two. Tinochchaca, Peru 7,000 ft. Yale-Peruvian Exped. Yale Univ. 1917.

PROC. U. S. NAT. MUS., **45**, 1913, p. 546.
Excellent examples.

OSTEOBLEPHARON OSBORNI Schmidt PARATYPE

12458. One. Bima R., Naipu, N. E. Congo Basin. Lang-Chapin Exped. Exch. Amer. Mus. Nat. Hist. 1919.

BULL. AMER. MUS. NAT. HIST., **39**, 1919, p. 421, pl. 13, fig. 1; text figs, 2, 3, 4, 5.
A good stuffed skin. According to Chabanaud, not a valid genus or species, but thoroughly reinstated by Mook.

OXYBELIS MICROPHTHALMUS Barbour and Amaral HOLOTYPE

22417. One. Santa Cruz Valley, Calabasas Canon, Arizona, U. S. A. C. T. Vorheis. C. T. Vorheis. 1926.

PROC. N. ENG. ZOÖL. CLUB, **9**, 1926, p. 79.
Good condition.

OXYRHOPUS TRIGEMINUS Duméril and Bibron COTYPE
= PSEUDOBOA TRIGEMINA (Duméril and Bibron)

2103. One. Bahia, Brazil. Exch. Paris Mus. through A. A. Duméril. 1865.

ERP. GÉN., **7**, 2, 1854, p. 1013.
Old and soft.

OZOTHECA TRISTYCHA Agassiz COTYPES
= STERNOTHERUS ODORATUS (Latreille).

1574. Four. Williamson Co., Texas, U. S. A. G. Stolley.
1576. Two. Osage R., Missouri, U. S. A. G. Stolley.

CONTR. NAT. HIST. U. S., **1**, 1857, p. 425.
All in good condition.

PACHYDACTYLUS LATICAUDUS Boettger COTYPES
= PHELSUMA LATICAUDA LATICAUDA (Boettger)

17656–60. Five. Nossi-be, Madagascar. A. Stumpff. Exch. Senck. Mus. 1923.

ZOÖL. ANZ., 1880, p. 280.
Only in fair condition.

PALUDICOLA ILLOTUS Barbour HOLOTYPE
= PLEURODEMA ILLOTUS (Barbour)

8314. One. Cordillera, west of Mendoza, Argentina (7,000 ft.). Carlos Reed. T. Barbour. 1922.

PROC. BIOL. SOC. WASH., **35**, 1922, p. 113.
In good condition.

PALUDICOLA IMITATOR Barbour and Dunn HOLOTYPE

345. One. Lake Cudajaz, Brazil. George Sceva. Thayer Exped. 1865.

PROC. BIOL. SOC. WASH., **34**, 1921, p. 160.

Excellent fresh condition.

PANOLOPUS COSTATUS Cope HOLOTYPE
= CELESTUS COSTATUS (Cope)

3606. One. Jeremie, Haiti. D. F. Weinland. Purchased. ?1859.

PROC. ACAD. NAT. SCI. PHILA., 1861, p. 494.

A mutilated, immature specimen. No. 1502 mentioned by Cope is an original number from an earlier catalogue. For a revision of this and related forms *cf.* Barbour, Proc. New England Zoölogical Club, **7**, 1919, p. 13, and less completely but touching especially this type and its condition, Barbour, Mem. Museum of Comparative Zoölogy, **44**, 1914, p. 306.

PANASPIS AENEUS Cope COTYPES
= CRYPTOBLEPHARUS LINEOCELLATUS (Gray)

5784. Two. Swan River, Australia. Peabody Mus., Salem. 1886.

PROC. ACAD. NAT. SCI. PHILA., 1868, p. 317.

Fair examples.

PARHOPLOPHRYNE USAMBARICUS Barbour and Loveridge
GENOTYPE AND HOLOTYPE

13818. One. Amani, Usambara Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.

MEM. MUS. COMP. ZOÖL., **50**, 1928, p. 260.

Excellent condition.

PELONECTES BOSCAI Lataste COTYPES
= TRITURUS BOSCAE (Lataste)

1622. Five. Galicia, Spain. M. Bosca. F. Lataste. 1879.

REV. INTERN. SCI., **3**, 1879, p. 275.

Good specimens.

PENTADACTYLUS BRUNNEUS Cope
= ?AELUROSAURUS BRUNNEUS (Cope)

Australia. Exch. Paris Mus. through A. A. Duméril. 1865.

PROC. ACAD. NAT. SCI. PHILA., 1868, p. 320.

Type not definitely stated to be in Museum of Comparative Zoölogy. However, many other things described in this paper were from the Museum of Comparative Zoölogy Collection and all others from the Museum of Peabody Academy, Salem, now transferred to the Museum of Comparative Zoölogy. This was also just after a large exchange had been made between the Museum of Comparative Zoölogy and the Paris Museum.

PEROPUS PACKARDII Cope COTYPE
= GEHYRA MUTILATA (Wiegmann)

5470. One. Penang, Malaya. Capt. W. H. A. Putnam. Peabody Mus., Salem. 1886.

PROC. ACAD. NAT. SCI. PHILA., 1868, p. 319.
An old tailless relic.

PEROPUS PUSILLUS Cope HOLOTYPE
= DIPLODACTYLUS SPINIGERUS Gray

5735. One. S. W. Australia. Peabody Mus., Salem. 1886.

PROC. ACAD. NAT. SCI. PHILA., 1868, p. 320.

PEROPUS ROSEUS Cope COTYPES
= LEPIDODACTYLUS LUGUBRIS (Duméril and Bibron)

5293. Five. Oahu, Hawaiian Is. Horace Mann. H. Mann. 1864.

PROC. ACAD. NAT. SCI. PHILA., 1868, p. 319.
Soft and rather macerated.

PHELSUMA LATICAUDA COMOROENSIS (Boettger). See PHELSUMIA COMOROENSIS Boettger COTYPES

PHELSUMA LATICAUDA LATICAUDA (Boettger). See PACHYDACTYLUS LATICAUDUS Boettger. COTYPES

PHELSUMA V-NIGRA (Boettger). See PHELSUMIA V-NIGRA Boettger. COTYPE

PHELSUMIA COMOROENSIS Boettger COTYPES
= PHELSUMA LATICAUDA COMOROENSIS (Boettger)

17636, 21953–54. Three. Grand Comoro Is. A. Voeltzkow. Exch. Senck. Mus. 1905 and 1925.

IN VOELTZKOW'S "REISE OST-AFR.," **3**, 1913, p. 336.
Fair examples.

PHELSUMIA V-NIGRA Boettger COTYPE
= PHELSUMA V-NIGRA (Boettger)

17644. One. Moheli, Comoro Is. A. Voeltzkow. Exch. Senck. Mus. 1905.

IN VOELTZKOW'S "REISE OST-AFR.," **3**, 1913, p. 337.
In good condition.

PHILAUTUS BASILANENSIS Taylor PARATYPES

14467–78. Two. Abung Abung, Basilan Id., Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **21**, 1922, p. 169, pl. 1, figs. 1, 2.
Excellent condition.

PHILAUTUS HAZELAE Taylor PARATYPES

10487–89. Three. Mt. Canloan Volcano, Negros, Philippine Is. E. H. Taylor. Exch. Carnegie Mus. 1925.

PHIL. JOUR. SCI., **16**, 1920, p. 298, pl. 3, fig. 2.
Fine specimens.

PHILAUTUS PALLIDIPES (Barbour). See IXALUS PALLIDIPES Barbour HOLOTYPE

PHILAUTUS POLILLENSIS Taylor PARATYPES

14469–72. Four. Polillo Id., Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **21**, 1922, p. 171, pl. 2, figs. 1–4.
Excellent condition.

PHILAUTUS WILLIAMSI Taylor PARATYPE

14473. One. Polillo Id., Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **21**, 1922, p. 167, pl. 1, figs. 3–6.
Excellent condition.

PHILODRYAS SERRA (Schlegel). See TELEOLEPIS STRIATICEPS Cope HOLOTYPE

PHRYNOBATRACHUS ACRIDOIDES (Cope). See STAUROIS ACRIDOIDES Cope COTYPES

PHRYNOBATRACHUS ACRIDOIDES Cope. See PHRYNOBATRACHUS BOULENGERI De Witte COTYPE

PHRYNOBATRACHUS BOULENGERI De Witte COTYPE
= PHRYNOBATRACHUS ACRIDOIDES Cope

14830. One. Beira, Portuguese East Africa. C. Grant. Exch. British Mus. 1928.

REV. ZOÖL. AFRICAINE, **6**, fasc. 2, 1919, p. 6.
Good condition.

PHRYNOBATRACHUS GASTONI Barbour and Loveridge HOLOTYPE

13946. One. Buta, Bas Uelé Province, Belgian Congo. Brother Joseph. F. R. Wulsin. 1928.

PROC. N. ENG. ZOÖL. CLUB, **10**, 1928, p. 88.
Excellent condition.

PHRYNOBATRACHUS KENIENSIS Barbour and Loveridge HOLOTYPE

3479. One. Mt. Kenya, Kenya Colony. G. M. Allen. W. L. Smith Exped. 1909.

PROC. N. ENG. ZOÖL. CLUB, **10**, 1928, p. 89.
Excellent condition.

PHRYNOBATRACHUS LIBERIENSIS Barbour and Loveridge
HOLOTYPE AND PARATYPES

11993. One. Gbanga, Liberia. G. M. Allen. Harvard Liberian Exped. 1926.

11994–99. Six. Gbanga, Liberia. G. M. Allen. Harvard Liberian Exped. 1926.

PROC. N. ENG. ZOÖL. CLUB, **10**, 1927, p. 14.
Excellent condition.

PHRYNOCEPHALUS ALPHERAKII Bedriaga COTYPE

22169. One. Choragos. Alpheraki. Exch. St. Petersburg Mus. 1926.

ANN. MUS. ZOÖL. ACAD. SCI. ST. PETERSBOURG, **10**, 1905 (1907), p. 222.
An excellent specimen.

PHRYNOCEPHALUS AXILLARIS IDAE Bedriaga COTYPE

22170. One. Nan-Schan, Mongolia. Roborowsky and Koslov. Exch. St. Petersburg Mus. 1926.

ANN. MUS. ZOÖL. ACAD. SCI. ST. PETERSBOURG, **10**, 1905 (1907), p. 159.
Good specimen.

PHRYNOCEPHALUS AXILLARIS KLEMENZI Bedriaga COTYPES

22171–72. Two. Turfan, China. Klemenz. Exch. St. Petersburg Mus. 1926.

ANN. MUS. ZOÖL. ACAD. SCI. ST. PETERSBOURG, **10**, 1905 (1907), p. 163.
Excellent condition.

PHRYNOCEPHALUS AXILLARIS MURIELIS Bedriaga COTYPE

22173. One. Chami Desert, W. China. Roborowsky and Koslov. Exch. St. Petersburg Mus. 1926.

ANN. MUS. ZOÖL. ACAD. SCI. ST. PETERSBOURG, **10**, 1905 (1907), p. 161.
Good condition.

PHRYNOCEPHALUS EUPTILOPUS Alcock and Finn COTYPE

7227. One. Baluchistan frontier, Afghanistan. Maynard and Macmahon. Exch. Indian Mus. 1908.

JOUR. ASIATIC SOC. BENGAL, **45**, 2, 1897, p. 556, pl. 12.
Fair condition, somewhat soft.

PHRYNOCEPHALUS PRZEWALSKII Strauch COTYPES

22177–78. Two. Alashan Desert, Mongolia. N. Przewalsky. Exch. St. Petersburg Mus. 1926.

VOY. PRZEWALSKI, REPT. AND BATR., 1876, p. 10, pl. 2, fig. 1.
Good specimens.

PHRYNOCEPHALUS SALENSKII Bedriaga COTYPE

22185. One. Urungu River, Mongolia. N. Przewalsky. Exch. St. Petersburg Mus. 1926.

ANN. MUS. ZOÖL. ACAD. SCI. ST. PETERSBOURG, **10**, 1905 (1907), p. 213.
Fine example.

PHRYNOCEPHALUS VLANGALII VLANGALII Strauch COTYPES

22179. One. "Chuan-chi" River, Gobi Desert, Mongolia. N. Przewalsky. Exch. St. Petersburg Mus. 1926.

22180. One. Lake Kuku-noa, Mongolia. Potanin. Exch. St. Petersburg Mus. 1926.

VOY. PRZEWALSKI, REPT. AND BATR., 1876, p. 20, pl. 3, fig. 3.
Good specimens.

PHRYNOCEPHALUS VLANGALII ROBOROWSKII Bedriaga COTYPE

22181. One. Zaidam, Tibet. N. Przewalsky. Exch. St. Petersburg Mus. 1926.

PRZEWALSKI REISE, **3**, 1, 1912, p. 474.
Good specimen. Described as var. *roborowskii*.

PHRYNONAX POECILONOTUS (Günther). See PHRYNONAX SHROPSHIREI Barbour and Amaral HOLOTYPE AND PARATYPE

PHRYNONAX SHROPSHIREI Barbour and Amaral
= PHRYNONAX POECILONOTUS (Günther) HOLOTYPE AND PARATYPE

18819. One. Fort Sherman, Canal Zone. J. B. Shropshire. J. B. Shropshire. 1924.

18820. Two. Fort Sherman, Canal Zone. J. B. Shropshire. J. B. Shropshire. 1924.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1924, p. 508.
Good examples which may represent a local race.

PHRYNOSOMA PLATYRHINOS Girard COTYPE

5948. One. Salt Lake Valley, Utah, U. S. A. Lt. Stansbury. Exch. U. S. Nat. Mus. 1879.

STANSBURY'S EXPL. SURV. VALLEY GREAT SALT LAKE, 1852, pp. 361, 363, pl. 7, figs. 1–5.
A faded old specimen.

PHRYNOSOMA SCHMIDTI Barbour HOLOTYPE AND PARATYPES

15142. One. Cedros Id., Lower California, Mexico. W. W. Brown, Jr. J. E. Thayer.

15144–45. Two. Cedros Id., Lower California, Mexico. W. W. Brown, Jr. J. E. Thayer.

PROC. N. ENG. ZOÖL. CLUB, **7**, 1921, p. 113.
Excellent examples.

PHYLLOBATES BEATRICIAE Barbour and Dunn HOLOTYPE
= PHYLLOBATES LUGUBRIS (Schmidt)

8022. One. Zent, Costa Rica. E. R. Dunn. T. Barbour. 1920.

PROC. BIOL. SOC. WASH., **34**, 1921, p. 159.
This fine form turns out to be Schmidt's old species from Western Panama.

PHYLLOBATES BOULENGERI (Barbour). See PROSTHERAPIS FEMORALIS Barbour COTYPES

PHYLLOBATES LUGUBRIS (Schmidt). See PHYLLOBATES BEATRICIAE Barbour and Dunn HOLOTYPE

PHYLLOBATES NUBICOLA Dunn PARATYPES

9922–27. Six. Gutierrez, 6,000 feet on trail from Chiriquicito to Boquete, Atlantic slope, Western Panama Republic. Dunn and Duryea. T. Barbour. 1923.

OCC. PAPERS MUS. ZOÖL. UNIV. MICH., **151**, 1924, p. 7, fig.

PHYLLOBATES SYLVATICA Barbour and Noble

HOLOTYPE AND PARATYPES

5344. One. Tabacónas (near Huancabamba), N. W. Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.

5345–50, 5355–58. Twelve. Tabacónas (near Huancabamba), N. W. Peru. G. K. Noble. Harvard Peruvian Exped. 1916.

BULL. MUS. COMP. ZOÖL., **63**, 1920, p. 396.
The type and a small suite of paratypes are well preserved.

PHYLLOBATES TRINITATIS Garman COTYPES

2181. Nine. Trinidad. S. Garman. Blake Exped. 1879.

BULL. ESSEX INST., **19**, 1887, p. 13.
A nice, well-preserved series.

PHYLLODACTYLUS BAURI Garman HOLOTYPE

9433. One. Las Cuevas, Charles Id., Galapagos Is. G. Baur. Exch. Clark Univ. 1914.

BULL. ESSEX INST., **24**, 1892, p. 82.
In fair condition.

PHYLLODACTYLUS MAGISTER Noble HOLOTYPE AND PARATYPES

17974. One. Perico, Chinchipe R., Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.

18143–50. Eight. Perico, Chinchipe R., Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.

18126–32. Six. Bellavista, Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1924, p. 110.
A splendid series.

PHYLLOMEDUSA NICÉFORI Barbour HOLOTYPE

11611. One. Villavicencio, Colombia. H^no^. Nicéforo Maria. T. Barbour. 1925.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1926, p. 191, pl. 12, figs. 1, 2.
A fine specimen.

PHYMATURUS SPURCUS Barbour HOLOTYPE AND PARATYPES

14791. One. Huanuluan, Rio Negro, Argentina. J. L. Peters. J. C. Phillips. 1921.

14912–15. Four. Huanuluan, Rio Negro, Argentina. J. L. Peters. J. C. Phillips. 1921.

PROC. BIOL. SOC. WASH., **34**, 1921, p. 139.
A fine series.

PHYSALAEMUS BARBOURI Parker PARATYPE

12840. One. La Plata, Argentine. Exch. British Mus. 1927.

ANN. MAG. NAT. HIST., (9) **20**, 1927, p. 463, text fig. 2e.
Good condition.

PHYSIGNATHUS COCINCINUS CAUDICINCTUS Barbour HOLOTYPE

8352. Skin and skull. Lao Kay, Tonkin. Koyobashi. Purchased. 1912.

PROC. BIOL. SOC. WASH., **25**, 1912, p. 192.
A fine alcoholic skin. The race may not stand.

PIPA PARVA Ruthven and Gaige PARATYPE

9012. One. Sabana de Mendoza, Venezuela. M. A. Carriker. Exch. Univ. of Mich. 1923.

OCC. PAPERS MUS. ZOÖL. UNIV., MICH., **136**, 1923, p. 1.
A wonderful little frog.

PIPA PIPA (Linné). See PIPA PERNIGRA Barbour HOLOTYPE

PIPA PERNIGRA Barbour = PIPA PIPA (Linné) HOLOTYPE

1442. One. Lago Maximo, Madeira River, Brazil. L. Agassiz. Thayer Exped. 1867.

PROC. N. ENG. ZOÖL. CLUB, **9**, 1923, p. 4, pl. 2, fig. 1.

PITUOPHIS MELANOLEUCUS MUGITUS Barbour HOLOTYPE

15525. One. 10 mi. N. of West Palm Beach, Florida, U. S. A. T. Barbour. T. Barbour. 1919.

PROC. N. ENG. ZOÖL. CLUB, **7**, 1921, p. 117.
A fine adult.

PLATYDACTYLUS THECONYX Duméril and Bibron COTYPES
= THECADACTYLUS RAPICAUDUS Houttuyn

1947. One. No locality. Exch. Paris Mus. through A. A. Duméril. N. D.

2162. One. Carthagena, Colombia. Exch. Paris Mus. through A. A. Duméril. 1865.
2166. One. Guadeloupe, Fr. W. I. Exch. Paris Mus. through A. A. Duméril. 1864.

ERP. GÉN., **3**, 1836, p. 306, pl. 33, fig. 2.
Rather poor specimens.

PLETHODON WEHRLEI Fowler and Dunn PARATYPE

4899. One. Two Lick Hills, Indiana Co., Pennsylvania, U. S. A. R. W. Wehrle. Exch. Acad. Nat. Sci. Phila. 1919.

PROC. ACAD. NAT. SCI. PHILA., 1917, p. 23, pl. 4.
A good example.

PLETHODON YONAHLOSSEE Dunn PARATYPES

4892–93. Two. Linville, N. Carolina, U. S. A. E. R. Dunn. Exch. Amer. Mus. Nat. Hist. 1916.

BULL. AMER. MUS. NAT. HIST., **37**, 1917, p. 598.
Good examples.

PLETHODONTOHYLA OCELLATA Noble and Parker PARATYPE

12841. One. Antsihanaka, Madagascar. Exch. British Mus. 1927.

AMER. MUS. NOVIT., **232**, 1926, p. 14.
Good condition.

PLEURODEMA ILLOTUS (Barbour). See PALUDICOLA ILLOTUS Barbour HOLOTYPE

POLYCHROIDES PERUVIANUS Noble
HOLOTYPE AND PARATYPES OF GENUS AND SPECIES

17973. One. Cajamarca Prov., Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.
18772–74. Two. Rio Marañon, Bellavista, Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.
18775–77. Three. Queriocotilla, Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1924, p. 109.
A fine little series of this remarkable species.

POLYPEDATES JAPONICUS (Hallowell). See IXALUS JAPONICUS Hallowell COTYPE

POLYPEDATES OWSTONI Stejneger PARATYPE

2599. One. Ishigaki-shima, Riu Kiu Is. A. Owston. Exch. U. S. Nat. Mus. 1909.

BULL. U. S. NAT. MUS., **58**, 1907, p. 149.
A good example.

POMATOPS VALVIFERA Barbour HOLOTYPE AND GENOTYPE

2577. One. Fak Fak, Dutch New Guinea. A. E. Pratt. T. Barbour. 1909.

PROC. BIOL. SOC. WASH., **23**, 1910, p. 89, pl. 1.
A good specimen for a recovery from a water snake's stomach.

POLYPEDATES LINKI Taylor PARATYPES

14451–53. Three. Bud Daho nr. Jolo, Jolo Id., Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **21**, 1922, p. 276, pl. 3, fig. 2.
Good condition.

POTAMOPHIS STRIATULUS (Linné). See VIRGINIA INORNATA Garman.

COTYPES

PRISTIURUS FLAVIPUNCTATUS Rüppell COTYPE OR GENOTYPE

19280. One. "Massoa" (sic) = Massowa, Abyssinia. E. Rüppell. Exch. Senck. Mus. 1924.

NEUE WIRBELTH. FAUNA ABYSS., REPT., 1835, p. 17, pl. 6, fig. 3.
A poor soft specimen.

PROCTOTRETUS CHILENSIS var. B Duméril and Bibron COTYPE
= LIOLAEMUS CHILENSIS (Duméril and Bibron)

2139. One. Chili. Exch. Paris Mus. through A. A. Duméril. 1865.

ERP. GÉN., **4**, 1837, p. 274.
A fine large example.

PROCTOTRETUS PICTUS var. B Duméril and Bibron COTYPE
= LIOLAEMUS PICTUS (Duméril and Bibron)

2137. One. Chili. Exch. Paris Mus. through A. A. Duméril. 1865.

ERP. GÉN., **4**, 1837, p. 278.
Excellent specimen.

PROCTOTRETUS TENUIS Duméril and Bibron COTYPE
= LIOLAEMUS TENUIS (Duméril and Bibron)

2138. One. Chili. Exch. Paris Mus. through A. A. Duméril. 1865.

ERP. GÉN., **4**, 1837, p. 279.
Another good specimen.

PROCTOTRETUS WIEGMANNII Duméril and Bibron COTYPE
= LIOLAEMUS WIEGMANNII (Duméril and Bibron)

2134. One. Chili. Exch. Paris Mus. through A. A. Duméril. 1865.

ERP. GÉN., **4**, 1837, p. 284.
In fair condition. Long on exhibition.

PROSTHERAPIS EQUATORIALIS Barbour COTYPES
= ELEUTHERODACTYLUS UNISTRIGATUS (Günther)

2261. Two. Ecuador. Aug. Müller coll. Purchased from Naturh. Inst. Linnea. 1890.

BULL. MUS. COMP. ZOÖL., **51**, 1908, p. 320.
Soft and discolored.

PROSTHERAPIS FEMORALIS Barbour COTYPES
= PHYLLOBATES BOULENGERI (Barbour)

2422. Twenty-two. Gorgona Id., Bay of Panama. W. W. Brown. J. E. Thayer. 1905.

BULL. MUS. COMP. ZOÖL., **46**, 1905, p. 101.
A soft series but in fair working condition. Cf. Proc. Biol. Soc. Wash., **22**, Apr. 1909, p. 87 for change of specific name.

PROSYMNA ORNATISSIMA Barbour and Loveridge
HOLOTYPE AND PARATYPES

23271. One. Nyange, Uluguru Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.
23269, 23272. Two. Nyange, Uluguru Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.

MEM. MUS. COMP. ZOÖL., **50**, 1928, p. 120, pl. 2, fig. 2.

PSAMMODROMUS EDWARDSII Duméril and Bibron COTYPES
= PSAMMODROMUS HISPANICUS EDWARDSIANUS (Dugès)

2140. Two. Marseilles, France. Exch. Paris Mus. through A. A. Duméril. 1865.

ERP. GÉN., **4**, 1837, p. 253.
Good specimens.

PSAMMODROMUS HISPANICUS EDWARDSIANUS (Dugès). See PSAMMODROMUS EDWARDSII Duméril and Bibron COTYPES

PSEUDABLABES AGASSIZII (Jan). See EIRENIS AGASSIZII Jan. COTYPE

PSEUDACRIS NIGRITA LeConte. See HYLODES MACULATUS Agassiz COTYPES

PSEUDELAPS MUELLERI INSULAE Barbour HOLOTYPE

7080. One. Djamma Id., Dutch New Guinea. T. Barbour. T. Barbour. 1907.

BULL. MUS. COMP. ZOÖL., **51**, 1908, p. 320.

A good specimen. The race also occurs apparently upon the adjacent mainland from the Manberano delta to the international boundary.

PSEUDIS FUSCA Garman COTYPES

1872. Two. Rio Arassuahy, Minas Geraes, Brazil. George Sceva. Thayer Exped. 1864–65.

SCIENCE OBSERVER, **4**, 1883, p. 47.

Good specimens.

PSEUDOBOA DOLIATA (Duméril and Bibron). See DREPANODON ERDISII Barbour HOLOTYPE

PSEUDOBOA TRIGEMINA (Duméril and Bibron). See OXYRHOPUS TRIGEMINUS Duméril and Bibron COTYPE

PSEUDOPAREAS VAGRANS Dunn HOLOTYPE AND PARATYPES

17284. One. Bellavista, Dept. Jaen, Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.

17430–53. Twenty-three. Bellavista, Dept. Jaen, Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.

PROC. BIOL. SOC. WASH., **36**, 1923, p. 187.

A small series, well preserved, of a very interesting form.

PSEUDORHABDIUM MCNAMARAE Taylor PARATYPE

20091. One. Mt. Canlaon, Occidental Negros, Philippine Is. E. H. Taylor. Exch. Carnegie Mus. 1925.

PHIL. JOUR. SCI., SECT. D, **12**, 1917, p. 363, text figs. 2a, b, c.

A good example.

PSEUDOTRITON RUBER NITIDUS Dunn HOLOTYPE

5649. One. White Top, Virginia. E. R. Dunn. T. Barbour. 1919.

PROC. BIOL. SOC. WASH., **33**, 1920, p. 133.
Only some ten specimens known of this apparently good form.

PSEUDOXENODON STEJNEGERII Barbour HOLOTYPE

7103. One. Mt. Arizan, Central Formosa. A. Owston's Collectors. T. Barbour. 1907.

BULL. MUS. COMP. ZOÖL., **51**, 1908, p. 317.
In very fair condition, a little soft.

PSEUDOXENOPUS ALLENI Barbour and Loveridge
HOLOTYPE AND GENOTYPE
= RANA ALLENI (Barbour and Loveridge)

11991. One. Firestone Plantation No. 3., Du River, Liberia. G. M. Allen. Harvard Liberian Exped. 1926.

PROC. N. ENG. ZOÖL. CLUB, **10**, 1927, p. 14.
Excellent condition.

PTYODACTYLUS LOBATUS OUDRII (Lataste). See PTYODACTYLUS OUDRII Lataste COTYPES

PTYODACTYLUS OUDRII Lataste COTYPES
= PTYODACTYLUS LOBATUS OUDRII (Lataste).

4639. Three. Bou Saada, Algeria. F. Lataste. F. Lataste. 1879.

LE NATURALISTE, 1880, p. 299.
Excellent specimens.

PTYODACTYLUS SANCTI-MONTIS Barbour HOLOTYPE AND PARATYPES

9757. One. Rasheya, base of Mt. Hermon, Syria. W. M. Mann. J. C. Phillips. 1914.

9755–56. Two. Hibbariyeh, Syria. W. M. Mann. J. C. Phillips. 1914.

PROC. N. ENG. ZOÖL. CLUB, **5**, 1914, p. 81.
A small series excellently preserved.

PYTHON SPILOTES (Lacépède). See MORELIA ARGUS Duméril and Bibron. COTYPE

RANA ABERDARIENSIS Angel PARATYPE

13961. One. Mt. Kinangop, Aberdare Mts., Kenya Colony (3,100 metres.) Alluaud and Jeannel. Exch. Paris. Mus. 1928.

IN "VOY. ALLUAUD ET JEANNEL EN AFR. ORI.," 1925, p. 42, pl. 2, figs. 1, 2.
Good condition.

RANA ACANTHI Taylor PARATYPES

14067–70. Four. Busuanga Id., Calamian Is., Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **22**, 1923, p. 523, pl. 2, fig. 1.
Excellent condition.

RANA ALLENI (Barbour and Loveridge). See PSEUDOXENOPUS ALLENI Barbour and Loveridge GENOTYPE AND HOLOTYPE

RANA ARATHOONI Malcolm Smith PARATYPES

13386–88. Three. Mt. Bonthain, Djikoro, S. Celebes. Malcolm Smith. T. Barbour. 1927.

PROC. ZOÖL. SOC. LOND., 1927, p. 207, pl. 2, fig. 2.
Excellent condition.

RANA BARBOURI Loveridge HOLOTYPE

10366. ♀, Nyambita, Mwanza, Tanganyika Territory. A. Loveridge. T. Barbour. 1925.

PROC. ZOÖL. SOC. LOND., 1925, p. 776.
An apparently well-marked form; type well preserved.

RANA BERLANDIERI Baird COTYPES
= RANA PIPIENS PIPIENS (Schreiber)

155. Two. Brownsville, Texas, U. S. A. Exch. U. S. Nat. Mus. 1879.

REPT. MEX. BOUND. SURV., 1857, p. 27, pl. 36, figs. 7–10.
Old specimens, in fair preservation.

RANA BEAUFORTI (Van Kampen). See CORNUFER BEAUFORTI Van Kampen COTYPE

RANA BREVIPALMATA RHOADSI Fowler PARATYPE
= RANA PALMIPES Spix

3216. One. Bucay, W. Ecuador. S. N. Rhoads. Exch. Acad. Nat. Sci. Phila. 1913.

PROC. ACAD. NAT. SCI. PHILA., 1913, p. 167.
A good specimen.

RANA CANTABRIGENSIS Baird
"Cambridge, Mass." Prof. L. Agassiz.

PROC. ACAD. NAT. SCI. PHILA., 1854, p. 62.
The type may be one of several old shriveled specimens with no satisfactory data.

RANA CLAMITANS Latreille. See RANA NIGRICANS Agassiz. COTYPES

RANA ERYTHRAEA (Schlegel). See HYLORANA SUBCOERULEA Cope
COTYPE

RANA ESCULENTA FORTIS Boulenger COTYPES
= RANA RIDIBUNDA RIDIBUNDA Pallas

6822–30. Eight. Berlin, Germany. G. A. Boulenger. Lataste Collection. Purchased. 1920.

THE ZOÖLOGIST, 1884, p. 220.
A fine series.

RANA ESCULENTA PEREZI Seoâne COTYPE
= RANA RIDIBUNDA PEREZI Seoâne

6832. One. La Coruna, Spain. Lataste Collection. T. Barbour. 1920.

THE ZOÖLOGIST, 1885, p. 171, fig.
A good specimen.

RANA FISHERI Stejneger = RANA ONCA Cope PARATYPE

4840. One. Las Vegas, Nevada, U.S.A. E. W. Nelson. Exch. U. S. Nat. Mus. 1919.

N. AMER. FAUNA, **7**, 1893, p. 227, pl. 3, fig. 5.
An immature specimen in poor preservation.

RANA GUERRERoI Taylor. PARATYPES

10482–84. Three. Baguio, Luzon, Philippine Is. E. H. Taylor. Exch. Carnegie Mus. 1925.

PHIL. JOUR. SCI., **16**, 1920, p. 255.
Good examples.

RANA HECKSCHERI Wright PARATYPE

10263. ♂. Callahan, Florida, U. S. A. A. H. Wright. A. H. Wright. 1925.

PROC. BIOL. SOC. WASH., **37**, 1924, p. 143, pls. 11–12.
A fine half-grown example of this little-known form.

RANA HOLTZI Werner COTYPE

8131. One. Cilician Taurus. Martin Holtz. Purchased from F. Werner. 1921.

ZOÖL. ANZ., **21**, 1898, p. 222.
A good specimen.

RANA IGOROTA Taylor PARATYPES

14096–98. Three. Balbalan, Kalinga subprovince, northern Luzon, Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **21**, 1922, p. 260, pl. 3, fig. 1.
Excellent condition.

RANA KOHCHANGAE Malcolm Smith PARATYPES

8778–79. Two. Koh Chang, Siam. Malcolm Smith. T. Barbour. 1922.

JOUR. NAT. HIST. SOC. SIAM, **4**, 1922, p. 223.
Excellent specimens.

RANA KOSEMPENSIS Werner COTYPE

13247. One. Kosempo, Formosa. Exch. Hamburg Mus. 1927.

MITT. NATURH. MUS. HAMBURG, **30**, 1913, p. 48.
Good condition.

RANA LABROSA (Cope). See TOMOPTERNA LABROSA Cope. COTYPES

RANA LATERIMACULATA Barbour and Noble* HOLOTYPE

3811. One. Sadong, Sarawak. H. W. Smith. H. W. Smith. 1915.

PROC. N. ENG. ZOÖL. CLUB, **6**, 1916, p. 21, fig. 3.
A good example.

RANA LEPTOGLOSSA (Cope). See HYLORANA LEPTOGLOSSA Cope COTYPES

RANA MACROGNATHUS DABANA Malcolm Smith PARATYPES

8804–05. Two. Langbian Plateau, Annam. Malcolm Smith. T. Barbour. 1922.

JOUR. NAT. HIST. SOC. SIAM, **4**, 1922, p. 221.
Fine specimens.

RANA MAGNA Stejneger PARATYPE

2597. One. Mt. Apo, Mindanao, Philippine Is. E. A. Mearns. Exch. U. S. Nat. Mus. 1910.

SMITHSON. MISC. COLL., **52**, 1908 (1910), p. 437.
In fair condition, immature.

RANA MASCARENIENSIS Duméril and Bibron COTYPE

1044. One. Madagascar. Exch. Paris Mus. through A. A. Duméril. 1864.

ERP. GÉN., **8**, 1841, p. 350.
Good condition but somewhat faded.

RANA MICRIXALUS Taylor PARATYPE

14187. One. Abung-abung, Basilan, Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **22**, 1923, p. 526, pl. 2, figs. 2, 3.
Excellent condition.

RANA MILLETI Malcolm Smith PARATYPES

8808–09. Two. Langbian Plateau, Annam. Malcolm Smith. T. Barbour. 1922.

PROC. ZOÖL SOC. LOND., 1921, p. 432.
Good specimens.

RANA MONTEZUMAE Baird COTYPE

2600. One. City of Mexico, Mexico. Exch. U. S. Nat. Mus.

PROC. ACAD. NAT. SCI. PHILA., 1855, p. 61.
A rather soft specimen.

RANA MONTIVAGA Malcolm Smith PARATYPES

8785–86. Two. Langbian Plateau, Annam. Malcolm Smith. T. Barbour. 1922.

PROC. ZOÖL. SOC. LOND., 1921, p. 436.
Good examples.

RANA MOODIEI Taylor PARATYPES

10475. One. Cabadbaran, Mindanao, Philippine Is. E. H. Taylor. Exch. Carnegie Mus. 1925.

10476–78. Three. Sumagui, Mindoro, Philippine Is. E. H. Taylor. Exch. Carnegie Mus. 1925.

PHIL. JOUR. SCI., **16**, 1920, p. 234, pl. 1, fig. 5.
Good examples.

RANA MWANZAE Loveridge* HOLOTYPE AND PARATYPE
= RANA OCCIPITALIS Günther

10337. ♀. River Simiyu at Sagayo, Mwanza, Tanganyika Territory. A. Loveridge. T. Barbour. 1925.

10338. ♀. River Simiyu at Sagayo, Mwanza, Tanganyika Territory. A. Loveridge. T. Barbour. 1925.

PROC. ZOÖL. SOC. LOND., 1925, p. 772, pl. 2.
Beautiful specimens.

RANA NIGRICANS Agassiz COTYPES
= RANA CLAMITANS Latreille

7. Three. Lake Superior. L. Agassiz. L. Agassiz. 1878.

Lake Superior, Boston, 1850, p. 379, pl. 6, figs. 4–5.
Old and shriveled.

RANA NIGROMACULATA MONGOLIA Schmidt PARATYPE

13823. One. Mai Tai Chao, Shansi, China. Clifford H. Pope. Exch. American Mus. of Nat. Hist. 1928.

AMER. MUS. NOVIT., **175**, 1925, p. 1.
Excellent condition.

RANA NIGROMACULATA NIGROMACULATA Hallowell. See TOMOPTERNA POROSA Cope COTYPES

RANA OCCIPITALIS Günther. See RANA MWANZAE Loveridge HOLOTYPE AND PARATYPE

RANA ONCA Cope. See RANA FISHERI Stejneger PARATYPE

RANA PALMIPES Spix. See RANA BREVIPALMATA RHOADSI Fowler PARATYPE

RANA PICTURATA Boulenger COTYPE

7613. One. Bidi Caves, Sarawak, Borneo. Exch. British Mus. 1921.

REC. INDIAN MUS., **20**, 1920, p. 179.
A good example.

RANA PIPIENS PIPIENS (Schreiber). See RANA BERLANDIERI Baird.
COTYPES

RANA PULLATUS Malcolm Smith. See RANA TASANAE Malcolm Smith.
PARATYPES

RANA RIDIBUNDA RIDIBUNDA Pallas. See RANA ESCULENTA FORTIS Boulenger
COTYPES

RANA RIDIBUNDA PEREZI (Seoâne). See RANA ESCULENTA PEREZI Seoâne
COTYPE

RANA SANGUINEA Boettger
COTYPES

9935–38. Four. Culion, Philippine Is. O. v. Mollendorff. Exch. Senck. Mus. 1924.

ZOÖL. ANZ., **16**, 1893, p. 364.
Fair condition, somewhat soft.

RANA SAUTERI JOHNSI Malcolm Smith
PARATYPE

8801. One. Langbian Plateau, Annam. Malcolm Smith. T. Barbour. 1922.

PROC. ZOÖL. SOC. LOND., 1921, p. 434.
Good specimen.

RANA SPINULOSA Malcolm Smith
PARATYPES

9426–28. Three. Tun Tao, Kachek R., Hainan Id. (400 ft.). Malcolm Smith. T. Barbour. 1924.

JOUR. NAT. HIST. SOC. SIAM, **6**, 1923, p. 207.
Excellent condition.

RANA STENOCEPHALA Boulenger
COTYPE

11755. One. Entebbe, Uganda. T. Barbour. 1926.

ANN. MAG. NAT. HIST., (7) **8**, 1901, p. 515.
Hardened and rather yellowish from alcohol but colours well preserved.

RANA SUBASPERA Barbour
HOLOTYPE

2440. One. Riu Kiu Is. Alan Owston. T. Barbour. 1907.

PROC. BIOL. SOC. WASH., **21**, 1908, p. 189.
A fine big frog. Some recognize the genus Babina.

RANA SULUENSIS Taylor PARATYPE

14224. One. Tawitawi Id., Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **16**, 1920, p. 215.
Excellent condition.

RANA TASANAE Malcolm Smith PARATYPES

8766–67. Two. Tasan, Siam. Malcolm Smith. T. Barbour. 1922.

JOUR. FED. MALAY STATES MUS., **10**, 1921, p. 193.
Two fine examples of this species which Smith first described under the preoccupied name of *Rana pullatus*.

RANA TIMORENSIS Malcolm Smith PARATYPES

13431–34. Four. Djamplong, South Timor. Malcolm Smith. T. Barbour. 1927.

13435–42. Nine. Soë, South Timor. Malcolm Smith. T. Barbour. 1927.

PROC. ZOÖL. SOC. LOND., 1927, p. 211, pl. 2, fig. 1.
Excellent condition.

RANA TORRENTUS (Malcolm Smith). See MICRIXALUS TORRENTIS Malcolm Smith COTYPES

RANA WOODWORTHI Taylor PARATYPES

14239–40. Two. Los Baños, Laguna Province, Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **22**, 1923, p. 519, pl. 1, figs. 1, 2.
Excellent condition.

RANA YAKANI Taylor PARATYPES

14257–66. Twenty-one. Abung Abung, Basilan Id., Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **21**, 1922, p. 262, pl. 1, fig. 1.
Excellent condition.

RANA ZETEKI Barbour HOLOTYPE AND PARATYPES

10031. One. Barro Colorado Id., Gatun Lake, Canal Zone. Panama Exped. '24. T. Barbour. 1924.

10032–34. Three. Barro Colorado Id., Gatun Lake, Canal Zone. Panama Exped. '24. T. Barbour. 1924.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1925, p. 156.
A race perhaps of *Rana warschewitschii* (Schmidt), formerly known as *Rana caeruleopunctata* (Cope).

RANODON OLYMPICUS Gaige PARATYPE
= RHYACOTRITON OLYMPICUS (Gaige)

4103. One. Lake Cushman, Washington, U. S. A. Philip Putnam. Exch. Univ. Mich. Mus. 1917.

OCC. PAPERS MUS. ZOÖL. UNIV. MICH., **40**, 1917, p. 2, pl. 1.
A fine example.

RAPPIA BAYONI Boulenger COTYPE
= HYPEROLIUS BAYONI (Boulenger)

3232. One. Bululo, Uganda. E. Bayon. Exch. British Mus. 1913.

ANN. MUS. GENOVA, (3), **5**, 1911, p. 168.
In fair condition.

RHAMNOPHIS ITURIENSIS Schmidt PARATYPE

13607. One. Gamangui, Belgian Congo. Lang-Chapin Exped. Exch. Amer. Mus. Nat. Hist. 1920.

BULL. AMER. MUS. NAT. HIST., **49**, 1923, p. 81.
A fine specimen.

RHINOCEROPHIS NASUS Garman HOLOTYPE
= BOTHROPS AMMODYTOIDES (Boulenger)

2063. One. Puerto San Antonio, S. Argentina. Count Pourtalès. Hassler Exped. 1873.

BULL. MUS. COMP. ZOÖL., **8**, 1881, p. 85.
In fair preservation.

RHINOCHELUS LECONTEI TESSELLATUS (Garman). See RHINOCHILUS TESSELLATUS Garman HOLOTYPE

RHINOCHILUS TESSELLATUS Garman HOLOTYPE
= RHINOCHELUS LECONTEI TESSELLATUS (Garman)

4577. One. Monoclova, Coahuila, Mexico. Edward Palmer. Purchased. 1880.

MEM. MUS. COMP. ZOÖL., **8**, 1883, p. 74.
A good example.

RHINOPHIS DRUMMOND-HAYI Wall COTYPES

14348–49. Two. Uva Patnas, Ceylon. Drummond Hay. Exch. British Mus. 1921.

SNAKES OF CEYLON, Colombo, 1921, p. 43.
Fine examples.

RHOMBOPHRYNE TESTUDO Boettger COTYPES

2163. One. Nossi-bé, Madagascar. A. Stumpff and C. Ebenau. A. Müller. 1890.
2236. One. Nossi-bé, Madagascar. A. Stumpff and C. Ebenau. Naturh. Inst. Linnea. 1890.
2731. Three. Nossi-bé, Madagascar. A. Stumpff and C. Ebenau. Exch. Vienna Mus. 1911.
9317–18. Two. Nossi-bé, Madagascar. A. Stumpff and C. Ebenau. Exch. Senck. Mus. 1923.

ZOÖL. ANZ., 1880, p. 568.
All rather soft but perfect examples.

RHYACOTRITON OLYMPICUS (Gaige). See RANODON OLYMPICUS Gaige. PARATYPE

RIOPA SUNDEVALLI (Smith). COTYPE
See EUMECES PERDICICOLOR Cope

SALAMANDRA NAEVIA Schlegel COTYPE
= HYNOBIUS NAEVIUS (Schlegel)

7365. One. Hondo and Shikoku, Japan. Exch. Leyden Mus. via British Museum. 1921.

FAUNA JAPONICA, 1838, p. 122, SAUR. AND BATR., pl.4, figs. 4–6, pl. 5, figs. 9–10.
An excellent example.

SAUROMALUS SLEVINI Van Denburgh PARATYPE

16780. One. Monserrate Id., Gulf of California, Mexico. J. R. Slevin. Exch. Calif. Acad. Sci. 1922.

OCC. PAPERS CALIF. ACAD. SCI., **10**, 1, 1922, p. 97.
All Slevin's material is beautifully preserved.

SCAPHIOPUS ALBUS Garman COTYPES

1453. Twelve. Key West, Florida, U. S. A. S. Garman. Blake Exped. 1879.

PROC. AMER. ASSOC. ADV. SCI., BUFFALO, 1877, p. 194.
Well preserved.

SCAPTEIRA LINEOLATA Nikolsky COTYPES

22195–97. Three. Chargali, Bokhara. V. Laschin. Exch. St. Petersburg Mus. 1926.

ANN. ZOÖL. MUS. ACAD. SCI. ST. PETERSBOURG, **1**, 1897, p. 330.
Fine example.

SCAPTEIRA PERSICA Nikolsky COTYPE

22199. One. Tscharachs, Zirckuch Dist., East Persia. N. Zarudny. Exch. St. Petersburg Mus. 1926.

ANN. MUS. ZOÖL. ACAD. SCI. ST. PETERSBOURG, **4**, 1899, p. 395, pl. 10, fig.
A good specimen.

SCAPTIRA APOROSCELES Alcock and Finn COTYPE
= MACMAHONIA APOROSCELES (Alcock and Finn)

7169. One. Baluchistan, west of Robat Id. on boundary of Baluchistan and Afghanistan. Dr. Maynard. Exch. Indian Mus. 1908.

JOUR. ASIAT. SOC. BENGAL, **65**, 1896, p. 559, pl. 13.
Good condition.

SCELOPORUS MONSERRATENSIS Van Denburgh PARATYPE

16840. One. Monserrate Id., Gulf of California, Mexico. J. R. Slevin. Exch. Calif. Acad. Sci. 1922.

PROC. CALIF. ACAD. SCI., (4), **11**, 1921, p. 396.
Fine example.

SCELOPORUS PYRRHOCEPHALUS Cope COTYPES

17552–53. Two. Colima, Mexico. John Xantus. Exch. U. S. Nat. Mus. 1923.

PROC. ACAD. NAT. SCI. PHILA., 1864, p. 177.
Soft and poorly preserved.

SCELOTES AENEUS Barbour and Loveridge HOLOTYPE AND PARATYPES

18355. One. Lumbo, Mozambique. A. Loveridge. T. Barbour. 1918.
18707–12. Six. Lumbo, Mozambique. A. Loveridge. T. Barbour. 1918.

PROC. N. ENG. ZOÖL. CLUB, **10**, 1928, p. 63.
Excellent condition.

Scelotes brevipes Hewitt COTYPES

21237–38, 22476–77. Four. Lourenço Marques, Portuguese East Africa. A. Habenicht. Exch. Transvaal Mus. 1925–26.

REC. ALBANY MUS., GRAHAMSTOWN, **34**, 1925, p. 353, pl. 15, fig. 4.
Excellent condition.

Scelotes bojeri (Desjardin). See Gongylus bojerii Desjardin. COTYPES

Scelotes brunneus Barbour HOLOTYPE

11870. One. Tamandrana R., Tamatave, Madagascar. F. R. Wulsin. F. R. Wulsin. 1915.

BULL. MUS. COMP. ZOÖL., **41**, 1918, p. 484, pl. 2, figs. 1, 2.
A fine adult.

Scelotes grammica (Cope). See Sepsina grammica Cope HOLOTYPE

Scelotes poecilopus Barbour and Loveridge HOLOTYPE

21255. One. Tamatave, East Madagascar. Herschell-Chauvin. Exch. Transvaal Mus. 1925.

PROC. N. ENG. ZOÖL. CLUB, **10**, 1928, p. 65.
Excellent condition.

Scelotes uluguruensis Barbour and Loveridge HOLOTYPE AND PARATYPES

24204. One. Bagilo, Uluguru Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.
24205–08. Four. Bagilo, Uluguru Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.
24209–12. Four. Vituri, Uluguru Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.

MEM. MUS. COMP. ZOÖL., **50**, 1928, p. 167, pl. 4, fig. 6.
Excellent condition.

Scelotes vulsini (Barbour). See Sepsina vulsini Barbour HOLOTYPE

Scolecomorphus attenuatus Barbour and Loveridge HOLOTYPE AND PARATYPE

12294. One. Nyingwa, Uluguru Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.

12295. One. Nyingwa, Uluguru Mts., Tanganyika Territory. A Loveridge. T. Barbour. 1927.

MEM. MUS. COMP. ZOÖL., **50**, 1928, p. 181.
Excellent condition.

SCOLECOMORPHUS ULUGURUENSIS Barbour and Loveridge
HOLOTYPE AND PARATYPES

12193. One. Nyingwa, Uluguru Mts., Tanganyika Territory, 7–8,000 feet. A. Loveridge. T. Barbour. 1927.
12194–206. One hundred and twenty. Nyingwa, Uluguru Mts., Tanganyika Territory, 7–8,000 feet. A. Loveridge. T. Barbour. 1927

MEM. MUS. COMP. ZOÖL., **50**, 1928, p. 180.
Excellent condition.

SCYTOPIS FUNEREUS Cope = HYLA FUNEREA (Cope) COTYPE

4778. One. Mayobamba, Peru. J. Orton. Exch. Acad. Nat. Sci. Phila. 1918.

PROC. ACAD. NAT. SCI. PHILA., 1874, p. 123.
In fair preservation only.

SEPSINA GRAMMICA Cope = SCELOTES GRAMMICA (Cope) HOLOTYPE

5787. One. Walfish Bay, S. W. Africa. Capt. Edmunds Lovett. Peabody Mus., Salem. 1886.

PROC. ACAD. NAT. SCI. PHILA., 1868, p. 318.
A fine specimen of a distinct species.

SCOLECOPHIS FUMICEPS Cope = ?TANTILLA PLANICEPS (Blainville)
?Cuba.

PROC. ACAD. NAT. SCI. PHILA., 1860, p. 371.
"Type in Mus. Comp. Zoöl." Cannot now be found.

SCOLECOSAURUS ALLENI Barbour TYPE AND PARATYPES

7793. Three. St. George, Grenada, Br. W. I. G. M. Allen. T. Barbour. 1910.

MEM. MUS. COMP. ZOÖL., **44**, 1914, p. 315, pl., figs. 11–15.
Good examples.

SCOLECOSAURUS TRINITATIS Barbour COTYPES

8947. One. Caparo, Trinidad. A. B. Carr. R. Thaxter. 1913.

8950–52, 8956–57. Five. Caparo, Trinidad. A. B. Carr. R. Thaxter. 1913.

MEM. MUS. COMP. ZOÖL., **44**, 1914, p. 316.
The type and a few paratypes represent this interesting species, now abundant in collections. Found chiefly under the cocoa pods in the lowland plantations.

SCOLECOSEPS BOULENGERI Loveridge PARATYPE

18357. One. Lumbo, Mozambique, Portuguese East Africa. A. Loveridge. T. Barbour. 1924.

PROC. ZOÖL. SOC., LOND., 1920, p. 159, text fig. 1.
A good example.

SCYTOPIS ALLENII Cope = HYLA RUBRA Daudin HOLOTYPE

1519. One. Para, Brazil. A. Agassiz et al. Thayer Exped. 1865.

PROC. AMER. PHIL. SOC., 1869, p. 162.
Somewhat hardened.

SEPSINA VULSINI Barbour = SCELOTES VULSINI (Barbour) HOLOTYPE

11869. One. East Forest between Tamatave and Tananarive, Madagascar. F. R. Wulsin. F. R. Wulsin. 1915.

BULL. MUS. COMP. ZOÖL., **61**, 1918, p. 485.
A fine large specimen.

SIAPHOS HERREI Taylor PARATYPES

26647–48. Two. Polillo Id., Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **21**, 1922, p. 194, pl. 7, fig. 1.
Excellent condition.

SIBYNOMORPHUS RUTHVENI Barbour and Dunn HOLOTYPE

15549. One. Aguacate Mts., Costa Rica. E. R. Dunn. T. Barbour. 1920.

PROC. BIOL. SOC. WASH., **34**, 1921, p. 158.
In fair preservation.

SIDEROLAMPRUS ENNEAGRAMMUS Cope HOLOTYPE
= DIPLOGLOSSUS ENNEAGRAMMUS Cope

2848. One. Jalapa, Mexico. R. Montes de Oca. Exch. R. Montes de Oca. 1872.

PROC. ACAD. NAT. SCI. PHILA., 1860, p. 368.
A young example, poorly preserved.

SIPHONOPS PARVICEPS Dunn HOLOTYPE

9407. One. La Loma, W. Panama. Dunn and Duryea. T. Barbour. 1923.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1924, p. 93.
A fine example.

SPELERPES DANIELSI Blatchley COTYPES
= GYRINOPHILUS DANIELSI (Blatchley)

6638–39. Two. [Sevier Co.] (sic) = Sevier, McDowell Co., N. Carolina, U. S. A. W. S. Blatchley. T. Barbour. 1920.

25TH ANN. REPT. DEPT. GEOL. INDIANA, 1900 (1901), p. 760.
In good condition.

SPELEREPS ORIZABENSIS Blatchley COTYPE
= OEDIPUS CEPHALICUS (Cope)

6640. One. S. W. slope Mt. Orizaba, Mexico. W. S. Blatchley. T. Barbour. 1920.

PROC. U. S. NAT. MUS., **16**, 1893, p. 38.
A very good example.

SPELERPES STEJNEGERI Eigenmann COTYPE
= EURYCEA MELANOPLEURA (Cope)

2551. One. Wilson's Cave, Jasper Co., Missouri, U. S. A. C. H. Eigenmann. C. H. Eigenmann. 1909.

TRANS. AMER. MICR. SOC., **23**, 1901, p. 189, pl. 27.
Fine example.

SPHAERODACTYLUS ALOPEX Cope COTYPES
= SPHAERODACTYLUS CINEREUS Wagler

3343. Three. Grand Anse R., Haiti. D. F. Weinland. Purchased. 1865.

PROC. ACAD. NAT. SCI. PHILA., 1861, p. 499.
Three fine specimens.

SPHAERODACTYLUS ANTHRACINUS Cope. See SPHAERODACTYLUS ASPER Garman COTYPES

SPHAERODACTYLUS ARGIVUS Garman COTYPES

6223, 13597. Eight. Cayman Brac, Br. W. I. C. J. Maynard. Purchased. 1888.

BULL. ESSEX INST., **20**, 1888, p. 3.

Good series. The specimen subsequently figured by Barbour (Mem. Mus. Comp. Zoöl., **47**, 1921, pl. 5, fig. 2) was separated from the original series and registered under No. 13597.

SPHAERODACTYLUS ASPER Garman COTYPES
= SPHAERODACTYLUS ANTHRACINUS Cope

6222. Two. Andros Id., Bahamas, Br. W. I. C. J. Maynard. Purchased. 1888.

BULL. ESSEX INST., **20**, 1888, p. 113.

Two giant adults.

SPHAERODACTYLUS CINEREUS Wagler. See
SPHAERODACTYLUS ALOPEX Cope COTYPES
SPHAERODACTYLUS INTERMEDIUS Barbour and Ramsden
HOLOTYPE AND PARATYPE

SPHAERODACTYLUS COPEI Steindachner. See SPHAERODACTYLUS PICTURATUS Garman COTYPES

SPHAERODACTYLUS CORTICOLUS Garman COTYPES

6219. Three. Rum Key, Bahamas, Br. W. I. C. J. Maynard. Purchased. 1888.

BULL. ESSEX INST., **20**, 1888, p. 111.

Good specimens.

SPHAERODACTYLUS DACNICOLOR Barbour COTYPES
= SPHAERODACTYLUS OXYRHINUS Gosse

7276. Two. Port Antonio, Jamaica. A. E. Wight. Purchased.

BULL. MUS. COMP. ZOÖL., **52**, 1910, p. 292, pl. 1.

Fine examples.

SPHAERODACTYLUS DECORATUS Garman HOLOTYPE
Also see SPHAERODACTYLUS FLAVICAUDUS Barbour

6220. One. Rum Key, Bahamas, Br. W. I. C. J. Maynard. Purchased 1888.

BULL. ESSEX INST., **20**, 1888, p. 11.

A tiny, badly dried specimen.

SPHAERODACTYLUS DECORATUS Garman. See SPHAERODACTYLUS FLAVICAUDUS Barbour COTYPES

SPHAERODACTYLUS DIFFICILIS Barbour HOLOTYPE AND PARATYPES

7834–35. Two. Santiago de la Vega, Santo Domingo. A. Hyatt Verrill. T. Barbour. 1910.

5444. One. Puerta Plata, Santo Domingo. M. Abbott Frazer. Purchased. 1885.

MEM. MUS. COMP. ZOÖL., **44**, 1914, p. 265.

A fine example.

SPHAERODACTYLUS ELEGANTULUS Barbour HOLOTYPE

12084. One. Antigua, Br. W. I. D. W. Griswold. D. W. Griswold. 1917.

PROC. BIOL. SOC. WASH., **30**, 1917, p. 163.

A young specimen, well preserved.

SPHAERODACTYLUS EXSUL Barbour HOLOTYPE AND PARATYPES

7894. One. Little Swan Id., off Honduras, Caribbean Sea. George Nelson. Mus. Exped. 1912.

9959, etc. Fifteen. Little Swan Id., off Honduras, Caribbean Sea. George Nelson. Mus. Exped. 1912.

MEM. MUS. COMP. ZOÖL., **44**, 1914, p. 264.

Type and series of paratypes well preserved.

SPHAERODACTYLUS FESTUS Barbour HOLOTYPE AND PARATYPE

10622. One. Martinique, Fr. W. I. A. G. Ruthven. Exch. Univ. of Mich. Mus. 1914.

10623. One. Martinique, Fr. W. I. A. G. Ruthven. Exch. Univ. of Mich. Mus. 1914.

PROC. BIOL. SOC. WASH., **28**, 1915, p. 73.

Two fine examples. Another paratype in Museum of Zoölogy, University of Michigan.

SPHAERODACTYLUS FLAVICAUDUS Barbour COTYPES
= ♂ SPHAERODACTYLUS DECORATUS Garman

6953, 13564. Fourteen. Mangrove Cay, Andros Id., Bahamas, Br. W. I. Bahama Exped., 1904. T. Barbour. 1904.

BULL. MUS. COMP. ZOÖL., **46**, 1904, p. 56.

These prove to be only the males of *Sphaerodactylus decoratus*. A good series. No. 13564 was reregistered from the original series.

SPHAERODACTYLUS GIBBUS Barbour HOLOTYPE AND PARATYPES

13436. One. Stocky Id., Exuma Key, opp. Roseville, Bahamas, Br. W. I. C. J. Maynard. T. Barbour. 1915.

13435, 13437. Two. Stocky Id., Exuma Key, opp. Roseville, Bahamas, Br. W. I. C. J. Maynard. T. Barbour. 1915.

MEM. MUS. COMP. ZOÖL., **47**, 1921, p. 228, pl. 1, fig. 2; pl. 10, figs. 5–8.
Good specimen of a distinct species.

SPHAERODACTYLUS GLAUCUS Cope COTYPE

13570. One. Merida, Yucatan. A. Schott. Exch. U. S. Nat. Mus. 1920.

PROC. ACAD. NAT. SCI. PHILA., 1865, p. 192.
In poor, soft condition.

SPHAERODACTYLUS GRANDISQUAMIS Stejneger PARATYPES
= SPHAERODACTYLUS MACROLEPIS Günther

7300. Four. Loquillo, Porto Rico. L. Stejneger. Exch. U. S. Nat. Mus.

REPT. U. S. NAT. MUS., 1902 (1904), p. 602, figs. 51–52.
A fine example.

SPHAERODACTYLUS INTERMEDIUS Barbour and Ramsden
HOLOTYPE AND PARATYPE
= SPHAERODACTYLUS CINEREUS Wagler

12305. One. Sierra de Hato Nuevo, Matanzas Prov., Cuba. T. Barbour. T. Barbour. 1918.

13726. One. Sierra de Hato Nuevo, Matanzas Prov., Cuba. T. Barbour. T. Barbour. 1918.

MEM. MUS. COMP. ZOÖL., **47**, 1919, p. 211.
Two good examples of a growth stage of *cinereus*.

SPHAERODACTYLUS MACROLEPIS Günther. See SPHAERODACTYLUS GRANDISQUAMIS Stejneger PARATYPES

SPHAERODACTYLUS MONILIFER Barbour HOLOTYPE

10786. One. Dominica, Br. W. I. G. A. Ramage. Exch. British Mus. 1915.

MEM. MUS. COMP. ZOÖL., **47**, 1921, p. 271, pl. 9, fig. 4; pl. 26, figs. 5–8.
A fine example.

SPHAERODACTYLUS OXYRHINUS Gosse. See SPHAERODACTYLUS DACNICOLOR Barbour COTYPES

SPHAERODACTYLUS PACIFICUS Stejneger PARATYPE

13727. One. Cocos Id., Costa Rica. Prof. Biolley. U. S. Nat. Mus. 1920.

PROC. BIOL. SOC. WASH., **16**, 1903, p. 3.
In fair condition.

SPHAERODACTYLUS PICTURATUS Garman COTYPES
= SPHAERODACTYLUS COPEI Steindachner

3341–42. Four. Near Grand Anse R., Haiti. D. F. Weinland. Purchased. 1865.

BULL. ESSEX INST., **19**, 1887, p. 19.
Good to fair specimens.

SPHAERODACTYLUS PICTUS Garman COTYPES

6071. Two. St. Kitts, Br. W. I. S. Garman. Blake Exped. 1880.

BULL. ESSEX INST., **19**, 1887, p. 20.
Good specimens.

SPHAERODACTYLUS SCABER Barbour and Ramsden
HOLOTYPE AND PARATYPES

12304. One ♀. Sierra de San Juan de los Perros, N. Camaguey, Cuba. T. Barbour. T. Barbour. 1918.
13438–41. Four. Sierra de San Juan de los Perros, N. Camaguey, Cuba. T. Barbour. T. Barbour. 1918.

MEM. MUS. COMP. ZOÖL., **47**, 1919, p. 126, pl. 3, fig. 3.
An excellent suite.

SPHAERODACTYLUS TORREI Barbour COTYPES

6916. Three. Santiago de Cuba. W. Robinson. W. Robinson. 1904.

MEM. MUS. COMP. ZOÖL., **44**, 1914, p. 260.
Good examples, the largest the one described.

SPHAERODACTYLUS VINCENTI Boulenger COTYPE

10788. One. St. Vincent, Br. W. I. G. A. Ramage. Exch. British Mus. 1915.

PROC. ZOÖL. SOC. LOND., 1891, p. 354.
A good example.

SPHENOMORPHUS ARBORENS Taylor PARATYPES

20142–43. Two. Canlaon Volcano, Occidental Negros, Philippine Is. E. H. Taylor. Exch. Carnegie Mus. 1925.

PHIL. JOUR. SCI., **12**, 1917, p. 373, pl. 1.
Good examples.

SPHENOMORPHUS BIPARIETALIS Taylor PARATYPES

20439. One. Jolo Id., Philippine Is. E. H. Taylor. T. Barbour. 1927.
26384–85. Two. Lapac, Sulu Archipelago, Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **13**, 1918, p. 249, text fig. 7.
Excellent condition.

SPHENOMORPHUS CURTIROSTRIS Taylor PARATYPES

20144–45. Two. Lake Mamil, Mindanao, Philippine Is. E. H. Taylor. Exch. Carnegie Mus. 1925.

PHIL. JOUR. SCI., **10**, 1915, p. 101.
Fine specimens.

SPHENOMORPHUS FLORENSIS BARBOURI Dunn PARATYPES

27026–31. Six. Nr. Uhak, North coast of Wetar, Dutch East Indies. Burden-Dunn Exped. T. Barbour. 1928.

AMER. MUS. NOVIT., **288**, 1927, p. 5.
Good condition.

SPHENOMORPHUS FLORENSIS NITIDUS Dunn PARATYPES

27016–25. Ten. Komodo Id., Dutch East Indies. Burden-Dunn Exped. T. Barbour. 1928.

AMER. MUS. NOVIT., **288**, 1927, p. 5.
Good condition.

SPHENOMORPHUS FLORENSIS WEBERI Dunn HOLOTYPE

20996. One. Station 277, Damma Id., Dutch East Indies. Siboga Exped. Exch. Amsterdam Mus. 1925.

AMER. MUS. NOVIT., **288**, 1927, p. 6.
Good condition.

SPHENOPHRYNE ANTHONYI Boulenger COTYPE

2896. One. Mt. Victoria, New Guinea. A. S. Anthony. Exch. British Mus. 1912.

ANN. MAG. NAT. HIST., (6), **19**, 1897, p. 10, pl. 2, fig.
A good specimen.

SPHENOPHRYNE MONTICOLA Boulenger COTYPE

2897. One. Lombok Id., Dutch East Indies. Mr. Alfred Everett. Exch. British Mus. 1912.

ANN. MAG. NAT. HIST., (6), **19**, 1897, p. 508.
A good specimen.

STAUROIS ACRIDOIDES Cope COTYPES
= PHRYNOBATRACHUS ACRIDOIDES (Cope)

15026–32. Seven. Zanzibar, E. Africa. C. Cooke. Purchased. 1862.

JOUR. ACAD. NAT. SCI. PHILA., 1867, p. 198.
Most of them somewhat macerated but several in good condition. Their throats rather more heavily spotted than in average mainland examples. Reregistered from Nos. 457 and 459 of old catalogue.

STENOCERCUS NIGROMACULATUS Noble HOLOTYPE AND PARATYPES

17975. One. Huancabamba R., Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.
18766–69. Four. Huancabamba R., Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1924, p. 112.
A fine series.

STENODACTYLUS ELIMENSIS Barbour HOLOTYPE

9631. One. Wady Gharandel, Sinai. J. C. Phillips and W. M. Mann. J. C. Phillips. 1914.

PROC. N. ENG. ZOÖL. CLUB, **5**, 1914, p. 79, pl. 2.
An excellent specimen.

STENOSTOMA MYOPICUM Garman COTYPES
= LEPTOTYPHLOPS MYOPICA (Garman)

4518. One. San Luis Potosí, Mexico. Edward Palmer. Edward Palmer. 1879.
4526. Three. Savineto, near Tampico, Mexico. Edward Palmer. Edward Palmer. 1879.
4592. One. San Pedro, Coahuila, Mexico. Edward Palmer. Edward Palmer. 1880.
6365. One. Mexico. W. B. Richardson. Purchased. 1865.

MEM. MUS. COMP. ZOÖL., **8**, 1883, p. 6.
Mostly in very good condition.

STENOSTOMA RUBELLUM Garman HOLOTYPE
= LEPTOTYPHLOPS DULCIS (Baird and Girard)

4584. One. Uvalde, Uvalde Co., Texas, U. S. A. Edward Palmer. Edward Palmer. 1880.

MEM. MUS. COMP. ZOÖL., **8**, 1883, p. 5.
A good little specimen.

STENOSTOMA TENUICULUM Garman HOLOTYPE
= LEPTOTYPHLOPS HUMILIS (Baird and Girard)

4519. One. San Luis Potosí, Mexico. Edward Palmer. Edward Palmer. 1879.

MEM. MUS. COMP. ZOÖL., **8**, 1883, p. 5.
A good specimen.

STEREOCYCLOPS INCRASSATUS Cope HOLOTYPE

1525. One. São Mateos, S. of Rio Janeiro, Brazil. Hartt and Copeland. Thayer Exped. 1864–65.

PROC. AMER. PHIL. SOC., 1869, p. 165.
In very poor condition, perhaps this form is near Grypiscus and Cyclorhamphus.

STERNOTHERUS CARINATUS (Gray). See GONIOCHELYS TRIQUETRA Agassiz COTYPE

STERNOTHERUS MINOR (Agassiz). See GONIOCHELYS MINOR Agassiz COTYPES

STERNOTHERUS ODORATUS (Latreille). See OZOTHECA TRISTYCHA Agassiz COTYPES

STUMPFFIA PSOLOGLOSSA Boettger COTYPES

9336–37. Two. Nossi-bé, Madagascar. A. Voeltzkow. Exch. Senck. Mus. 1923.

ZOÖL. ANZ., 1881, p. 360.
Good specimens.

SYRRHOPHUS CARYOPHYLLACEUS Barbour HOLOTYPES AND PARATYPES
= ELEUTHERODACTYLUS CARYOPHYLLACEUS (Barbour)

13039. One. La Loma, W. Panama. E. R. Dunn. T. Barbour. 1927.
13040–49. Ten. La Loma, W. Panama. E. R. Dunn. T. Barbour. 1927.

PROC. N. ENG. ZOÖL CLUB, **10**, 1928, p. 28, pl. 2, fig. 1.
Excellent condition.

SYRRHOPHUS INEPTUS Barbour HOLOTYPE

13050. One. Rio Chenillo, Canal Zone. W. S. Brooks and E. Wigglesworth. T. Barbour. 1927.

PROC. N. ENG. ZOÖL. CLUB, **10**, 1928, p. 25, pl. 1, fig. 1.
A second specimen is now in the museum, it was obtained on the Rio Tapia, Panama Republic by the same collectors.

SYRRHOPHUS LUTOSUS Barbour and Dunn HOLOTYPE

8023. One. Navarro, Costa Rica. E. R. Dunn. T. Barbour. 1920.

PROC. BIOL. SOC. WASH., **34**, 1921, p. 158.
A good specimen.

SYRRHOPHUS MOLINOI Barbour HOLOTYPE

13051. One. Barro Colorado Id., Canal Zone. T. Barbour. T. Barbour. 1927.

PROC. N. ENG. ZOÖL. CLUB, **10**, 1928, p. 28, pl. 2, fig. 2.
Excellent condition.

SYRRHOPHUS MYSTACEUS Barbour HOLOTYPE

8241. One. Cerro de los Estropajos, W. of Jalapa, Mexico. E. R. Dunn. T. Barbour. 1921.

PROC. BIOL. SOC. WASH., **35**, 1922, p. 112.
A well-preserved example.

SYRRHOPHUS OBESUS Barbour HOLOTYPE AND PARATYPE
= ELEUTHERODACTYLUS OBESUS (Barbour)

13052. One. Gutierrez, Bocas del Toro, W. Panama. Dunn and Duryea. T. Barbour. 1927.
13053–55. Three. Gutierrez, Bocas del Toro, W. Panama. Dunn and Duryea. T. Barbour. 1927.

PROC. N. ENG. ZOÖL CLUB, **10**, 1928, p. 27, pl. 1, fig. 3.
Excellent condition.

SYRRHOPHUS PARDALIS Barbour HOLOTYPE AND PARATYPE

13057. One. La Loma, Chiriquicito, to Boquete trail, Panama Republic. E. R. Dunn. T. Barbour. 1927.
13058–60. Three. La Loma, Chiriquicito, to Boquete trail, Panama Republic. E. R. Dunn. T. Barbour. 1927.

PROC. N. ENG. ZOÖL. CLUB, **10**, 1928, p. 26, pl. 1, fig. 2.
Excellent condition.

TACHYMENIS PERUVIANA Wiegmann. See LEIMADOPHIS ANDICOLUS Barbour HOLOTYPE AND PARATYPE

TACHYMENIS SURINAMENSIS Dunn HOLOTYPE AND PARATYPE

5133. One. Surinam. Probably from F. W. Cragin of Paramaribo.
16714. One. Surinam. Probably from F. W. Cragin of Paramaribo.

PROC. BIOL. SOC. WASH., **35**, 1922, p. 220.

Very fair specimens. The number of the type is "5133" not "5123" as given by Dunn. The paratype "16714" was merely referred to as "a second specimen."

TANTILLA ALBICEPS Barbour HOLOTYPE

20600. One. Barro Colorado Id., Gatun Lake, Canal Zone. T. Barbour. T. Barbour. 1925.

OCC. PAPERS BOSTON SOC. NAT. HIST., **5**, 1925, p. 156.

Well preserved.

TANTILLA DEVIATRIX Barbour HOLOTYPE

6195. One. San Luis Potosí, Mexico. Edward Palmer. Purchased. 1885.

PROC. BIOL. SOC. WASH., **29**, 1916, p. 94.

A fine specimen.

TANTILLA EISENI Stejneger PARATYPE

12089. One. Fresno, California. G. Eisen. Exch. U. S. Nat. Mus. 1917.

PROC. U. S. NAT. MUS., **18**, 1896, p. 117.

Rather soft.

TANTILLA MELANOCEPHALA (Linné). See ELAPOMORPHUS NUCHALIS Barbour HOLOTYPE

?TANTILLA PLANICEPS (Blainville). See SCOLECOPHIS FUMICEPS Cope

TARBOPHIS BEETZII Barbour HOLOTYPE

16728. One. Kolmanskop, S. W. Africa. Werner Beetz. Prof. C. Palache. 1921.

PROC. BIOL. SOC. WASH., **35**, 1922, p. 229–230.

A good specimen. Since found by Mr. W. S. Brooks at Luderitz Bay about seventy miles from the type locality.

TELEOLEPIS STRIATICEPS Cope HOLOTYPE
= PHILODRYAS SERRA (Schlegel)

2909. One. Brazil. George Sceva. Thayer Exped. 1864–65.

PROC. AMER. PHIL. SOC., **11**, 1869, p. 153.

Cope cites M. C. Z. No. "909." This is either an original number of more likely a lapsus for "2909" which is the number it now bears and the data of which fits this specimen.

TELESCOPUS GEOFFROYANUS CYPRIANUS Barbour and Amaral HOLOTYPE

22375. One. Cyprus. Exch. British Mus. 1926.

In fine condition.

TELMATOBIUS CULEUS (Garman). See CYCLORHAMPHUS CULEUS Garman COTYPE

TELMATOBIUS IGNAVUS Barbour and Noble HOLOTYPE

4093. One. Huancabamba, Prov. Piura, N. W. Peru. G. K. Noble. Harvard-Peruvian Exped. 1916.

BULL. MUS. COMP. ZOÖL., **58**, 1920, p. 414.

A beautiful specimen.

TELMATOBIUS NIGER Barbour and Noble HOLOTYPE AND PARATYPES

3037. One. Palmira Desert, Ecuador, 10,500 ft. "Mining engineer." T. Barbour. 1907.

3035–36, 3038–40. Five. Palmira Desert, Ecuador, 10,500 ft. "Mining engineer." T. Barbour. 1907.

BULL. MUS. COMP. ZOÖL., **58**, 1920, p. 413.

The largest specimen is the type, the others paratypes. Specimens from this series are in Washington (U. S. National Museum), Ann Arbor, and possibly elsewhere. They were distributed as *T. jelskii* before topotypes of that species had been seen.

TERRAPENE CAROLINA (Linné). See CISTUDO VIRGINEA Agassiz. COTYPES

TERRAPENE CAROLINA TRIUNGUIS (Agassiz). See CISTUDO TRIUNGUIS Agassiz COTYPES

TERRAPENE MAJOR (Agassiz). See CISTUDO MAJOR Agassiz COTYPES

TERRAPENE ORNATA (Agassiz). See CISTUDO ORNATA Agassiz COTYPES

TESTUDO CLIVOSA Garman HOLOTYPE

11075. One. [?Galapagos Is.]. "Narraga 1861" Boston Soc. Nat. Hist. 1914.

MEM. MUS. COMP. ZOÖL., **30**, 1917, p. 283, pl. 21.

A bony shell with seven or eight scutes in place. Of its history nothing definite is known but it was supposed to have come from the Mascarenes.

TESTUDO ELEPHANTOPUS Harlan ?COTYPE

11063. One. Galapagos Is. "C. de S." W. Lyman. Boston Soc. Nat. Hist. 1914.

JOUR. ACAD. NAT. SCI. PHILA., 1827, p. 284, fig. 11.

Perhaps a cotype. Harlan mentions seeing several specimens. One should be in the Academy at Philadelphia, but cannot be found. This specimen (11063) bears much resemblance to Harlan's figure.

TESTUDO GALAPAGOENSIS Baur HOLOTYPE
= TESTUDO NIGRA Quoy and Gaimard

11064. One. Galapagos Is. "Ship Abigail, 1835, Bej. Clark, Master." Boston Soc. Nat. Hist. 1914.

AMER. NAT., **23**, 1889, p. 1044.

A giant shell figured by Garman on plate 35 of Mem. Mus. Comp. Zoöl., **30**, 1917 and referred to on p. 289.

TESTUDO NIGRA Quoy and Gaimard. See TESTUDO GALAPAGOENSIS Baur HOLOTYPE

TESTUDO TYPICA Garman HOLOTYPE

11072. One. [?Galapagos Is.]. C. F. Winslow. Boston Soc. Nat. Hist. 1914.

MEM. MUS. COMP. ZOÖL., **30**, 1917, p. 285, pls. 22, 34.

A dried shell.

THAMNOPHIS PROXIMUS (Say). See EUTAENIA FAIREYI Baird and Girard COTYPE

THASSOCHELYS (COLPOCHELYS) KEMPII Garman COTYPES
= CARETTA KEMPII (Garman)

Gulf of Mexico. Mr. Kemp of Key West. Kemp.

BULL. MUS. COMP. ZOÖL., **6**, 1880, p. 123.

These specimens are mounted and on exhibition in the systematic gallery of reptiles; one is a skeleton.

THECADACTYLUS RAPICAUDUS Houttuyn. See PLATYDACTYLUS THECONYX Duméril and Bibron — COTYPES

TIAPORUS FULIGINOSUS Cope — COTYPE

20294. One. Swan Id., off Honduras Coast, Caribbean Sea (Extinct). C. H. Townsend. Exch. U. S. Nat. Mus. 1925.

PROC. AMER. PHIL. SOC., **30**, 1892, p. 132, pl. 1.
A soft example of this species exterminated since the introduction of cats.

TOMOPTERNA LABROSA Cope — COTYPES
= RANA LABROSA (Cope)

1583, 1585. Three. Madagascar. Capt. W. W. Goodhue. A. Agassiz.

PROC. ACAD. NAT. SCI. PHILA., 1868, p. 138.
Old poor specimens.

TOMOPTERNA POROSA Cope — COTYPES
= RANA NIGROMACULATA NIGROMACULATA Hallowell

1611. Three. Kanagawa, Japan. J. F. Gulick. J. F. Gulick.

PROC. ACAD. NAT. SCI. PHILA., 1868, p. 139.
Poor specimens.

TRACHYCEPHALUS OVATUS Cope — HOLOTYPE
= HYLA DOMINICENSIS Tschudi

1518. One. Jeremie, Haiti. D. F. Weinland. Purchased. 1859.

PROC. ACAD. NAT. SCI. PHILA., 1863, p. 44.
A good specimen.

TRETANORHINUS INSULAE-PINORUM Barbour — PARATYPE

11190. One. Los Indios, Isle of Pines, Cuba. G. A. Link. Carnegie Mus. 1915.

ANN. CARNEGIE MUS., **10**, 1916, p. 306.
A good example.

TRETANORHINUS NIGROLUTEUS Cope. See HELICOPS AGASSIZII Jan. — HOLOTYPE

TRETIOSCINCUS LAEVICAUDUS Cope — COTYPES

5788. Three. Polvon, Nicaragua. McNeil. Peabody Mus., Salem. 1886.

PROC. AMER. PHIL. SOC., **11**, 1870, p. 557.
One cotype found in this Museum and two returned recently from the Philadelphia Academy where several remain.

TRIGONOCEPHALUS ASPER Garman COTYPES
= BOTHROPS ATROX (Linné)

2718. Two heads. Obispo, Isthmus of Darien. G. A. Maack. G. A. Maack. 1871.

MEM. MUS. COMP. ZOÖL., **8**, 1883, p. 124.
Very large old adult heads which have the carinate scales tectiform and scabrous. The old town of Bas Obispo, Panama, is now under the waters of Gatun Lake in the Canal Zone.

TRIGONOCEPHALUS CARIBBAEUS Garman COTYPES
= BOTHROPS ATROX (Linné.)

4812. One. St. Lucia, Br. W. I. C. Semper. C. Semper. 1879.
4813. One. St. Pierre, Martinique, Fr. W. I. A. Morgan. A. Morgan. 1879.
4814. One. St. Lucia, Br. W. I. S. Garman. S. Garman. 1879.

PROC. AMER. PHIL. SOC., **24**, 1887, p. 285.
Rather soft specimens.

TRIGONOCEPHALUS INTERMEDIUS Strauch COTYPE
= AGKISTRODON BLOMHOFFII INTERMEDIUS (Strauch)

5385. One. Minnesinsk, Government of Irkutsk, Siberia. Exch. St. Petersburg Mus. 1885.

MEM. ACAD. SCI. ST. PETERSBOURG, (7), **21**, 4, 1873, p. 245, 282.
A good specimen.

TRIMERESURURUS GRAMINEUS YUNNANENSIS (Schmidt). See TRIMERESURUS YUNNANENSIS Schmidt PARATYPES

TRIMERESURUS HALIEUS Griffin. (TRIMERISURUS *err. typ.*) COTYPE

25854. One. Polillo Id., Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI. SECT. D, **5**, 1910, p. 214.
Excellent condition.

TRIMERESURUS YUNNANENSIS Schmidt PARATYPES
= TRIMERESURUS GRAMINEUS YUNNANENSIS (Schmidt)

14671. One. Yunnan-fu, Yunnan, China. Rev. J. Graham. T. Barbour. 1921.
16734. One. Luchien-hsien, Yunnan, China. Rev. J. Graham. T. Barbour. 1922.

AMER. MUS., NOVIT., **157**, 1925, p. 4.
Excellent condition.

TRITURUS BOSCAI (Lataste). See PELONECTES BOSCAI Lataste COTYPES

TRITURUS ITALICUS (Peracca). See MOLGE ITALICA Peracca COTYPES

TRITURUS VIRIDESCENS DORSALIS (Harlan). See DIEMYCTYLUS VIRIDESCENS VITTATUS H. Garman COTYPES

TROPIDONOTUS (MACROPOPHIS) MELANOCEPHALUS Werner PARATYPE
= NATRIX MELANOCEPHALA (Werner)

22201. One. New Britain. F. Werner coll. Purchased. 1925.

SITZB. AKAD. WISS. WIEN, **134**, abt. 1, 1925, p. 47.
In fair condition.

TROPIDONOTUS TAXISPILOTUS Holbrook COTYPES ?
= NATRIX TAXISPILOTA (Holbrook)

16. Head. Charleston, S. Carolina, U. S. A. J. E. Holbrook. Holbrook to L. Agassiz.
21. One. Charleston, S. Carolina, U. S. A. J. E. Holbrook. Holbrook to L. Agassiz.

NORTH AMER. HERP., ed. 2, **4**, 1842, p. 35.

These specimens may represent one or both cotypes mentioned by Holbrook which were from the "South Carolina seaboard and the Altamaha River, Georgia." Undoubtedly given to Professor Agassiz by Holbrook during one of his early years of lecturing at Charleston, they were brought to Cambridge by him and were finally labeled simply Charleston, as were most of the other specimens which Holbrook gave to Agassiz.

Holbrook speaks of the head of one of the types being 1 inch 6 lines, that of M. C. Z. No. 16 is almost 2 inches, and of No. 21, is at most only 1 inch. This same specimen according to Holbrook was 35 inches in total length with 144 ventrals and 79 subcaudals while M. C. Z. No. 21 is 25 inches with 140 ventrals and 77 subcaudals.

TROPIDOPHIS MACULATUS JAMAICENSIS Stull HOLOTYPE AND PARATYPE

12090. One. Kingston, Jamaica. M. Grabham. T. Barbour. 1917.
7376. One. Kingston, Jamaica. T. Barbour. T. Barbour. 1909.

OCC. PAPERS MUS. ZOÖL. UNIV. MICH., **195**, 1928, p. 12.
Good condition.

TROPIDOPHIS PARDALIS CURTUS (Garman). See UNGUALIA CURTA Garman HOLOTYPE

TROPIDOPHORUS HAINANUS Malcolm Smith PARATYPES

18001–02. Two. Ang Mao, Hainan Id. Malcolm Smith. T. Barbour. 1924.

PROC. ZOÖL. SOC. LOND., 1923, p. 779.
Fine examples.

TROPIDOPHORUS LAOTUS Malcolm Smith PARATYPES

16658–59. Two. Muang Liep, Siam. Malcolm Smith. T. Barbour. 1922.

PROC. ZOÖL. SOC. LOND., 1923, p. 777.
Fine specimens.

TROPIDOPHORUS PERPLEXUS Barbour HOLOTYPE

14632. One. Long Loba, Tinjar R., Sarawak. H. W. Smith. H. W. Smith. 1921.

PROC. N. ENG. ZOÖL. CLUB, **7**, 1921, p. 88.
A fine example.

TROPIDOPHORUS RIVULARIS Taylor PARATYPES

21024, 26537–38. Three. Bunawan, Agusan Prov. Philippine Is. E. H. Taylor. Exch. Carnegie Mus. and Gift of T. Barbour. 1925 and 1927.

PHIL. JOUR. SCI., **10**, 1915, p. 106.
A good example.

TROPIDOPHORUS ROBINSONI Malcolm Smith PARATYPES

16661–62. Two. Tasan, S. Siam. Malcolm Smith. T. Barbour. 1922.

JOUR. NAT. HIST. SOC. SIAM, **3**, 1919, p. 223.
Good examples.

TROPIDOPHORUS STEJNEGERI Taylor PARATYPES

26533–36. Four. Abung Abung, Basilian Id., Philippine Is. E. H. Taylor. T. Barbour. 1927.

PHIL. JOUR. SCI., **21**, 1922, p. 285, pl. 4, fig. 1.
Excellent condition.

TROPIDURUS ABINGDONII Baur COTYPES
= TROPIDURUS PACIFICUS Steindachner

22667–68. Two. Abingdon Id., Galapagos Is. Albatross Exped. Exch. U. S. Nat. Mus. 1926.

BIOL. CENTRALBL., **10**, 1890, p. 479.
Good condition.

TROPIDURUS ALBEMARLENSIS Baur COTYPE
= TROPIDURUS ALBEMARLENSIS ALBEMARLENSIS Baur.

22663. One. Albemarle Id., Galapagos Is. Albatross Exped. Exch. U. S. Nat. Mus. 1926.

BIOL. CENTRALBL. **10**, 1890,, p. 478.
Good condition.

TROPIDURUS ALBEMARLENSIS ALBEMARLENSIS Baur. See TROPIDURUS ALBEMARLENSIS Baur, INDEFATIGABILIS Baur, JACOBII Baur COTYPES

TROPIDURUS ALBEMARLENSIS BARRINGTONENSIS Baur. See TROPIDURUS BARRINGTONENSIS Baur COTYPES

TROPIDURUS BARRINGTONENSIS Baur COTYPES
= TROPIDURUS ALBEMARLENSIS BARRINGTONENSIS (Baur)

9401–3. Three. Barrington Id., Galapagos Is. G. Baur. Exch. Clark Univ. 1914.

FESTSCHRIFT FÜR LEUCKART, 1892, p. 268, fig.
Well preserved.

TROPIDURUS DELANONIS Baur. See TROPIDURUS HOODENSIS Baur COTYPES

TROPIDURUS HOODENSIS Baur COTYPE
= TROPIDURUS DELANONIS Baur COTYPE

22664. One. Hood Id., Galapagos Is. Albatross Exped. Exch. U. S. Nat. Mus. 1926.

BIOL. CENTRALBL., **10**, 1890, p. 478 (substituting name).
Good condition.

TROPIDURUS INDEFATIGABILIS Baur COTYPES
= TROPIDURUS ALBEMARLENSIS ALBEMARLENSIS Baur

22665. One. Indefatigable Id., Galapagos Is. Albatross Exped. Exch. U. S. Nat. Mus. 1926.

22666. One. James Id., Galapagos Is. Albatross Exped. Exch. U. S. Nat. Mus. 1926.

BIOL. CENTRALBL., **10**, 1890, p. 478.
Good condition.

TROPIDURUS JACOBII Baur = TROPIDURUS ALBEMARLENSIS ALBEMARLENSIS Baur — COTYPES

9410–11, 9881–82. Four. James Id., Galapagos Is. G. Baur. Exch. Clark Univ. 1914.
9421–24. Four. Jervis Id., Galapagos Is. G. Baur. Exch. Clark Univ. 1914.

FESTSCHRIFT FÜR LEUCKART, 1892, p. 269.
All in good condition.

TROPIDURUS PACIFICUS Steindachner. See TROPIDURUS ABINGDONII Baur. — COTYPES

TROPIDURUS PERUVIANUS (Lesson). See MICROLOPHUS LESSONII Duméril and Bibron. — COTYPE

TYMPANOCRYPTIS LINEATA CENTRALIS Sternfeld. — PARATYPE

21885. One. Fonke R., Central Australia. Exch. Senck. Mus. 1925.

ABH. SENCKENB. NAT. GES., **38**, 1925, p. 234.

TYPHLOPS AVAKUBAE Schmidt — PARATYPE

13600. One. Medje, Belgian Congo. Lang-Chapin Exped. Exch. Amer. Mus. Nat. Hist. 1920.

BULL. AMER. MUS. NAT. HIST., **49**, 1923, p. 51, fig. 1.
Well preserved.

TYPHLOPS BEDDOMII Boulenger — COTYPE

22372. One. Travancore Hills, S. India. Col. Beddome. Exch. British Mus. 1926.

FAUNA BRITISH INDIA, REPT., 1890, p. 237.
A fine specimen.

TYPHLOPS CUMINGII MANSUETUS Barbour — HOLOTYPE

14270. One. Keri Keri, San Cristobal Id., Solomon Is. W. M. Mann. Mus. Exped. 1921.

PROC. N. ENG. ZOÖL. CLUB, **7**, 1921, p. 108, pl. 6.
A fine example.

TYPHLOPS FORNASINII Bianconi. See ONYCHOCEPHALUS TRILOBUS Peters. COTYPE

TYPHLOPS LONGICAUDA Taylor PARATYPES

20076–77. Two. Bunawan, Agusan Prov., Philippine Is. E. H. Taylor. Exch. Carnegie Mus. 1925.

PHIL. JOUR. SCI., **14**, 1919, p. 108.
A very good pair of specimens.

TYPHLOPS MOSSAMBICUS (Peters). See ONYCHOCEPHALUS MOSSAMBICUS Peters COTYPE

TYPHLOPS OLIVACEUS REDUNCUS Barbour HOLOTYPE

14269. One. Keri Keri, San Cristobal Id., Solomon Is. W. M. Mann. Mus. Exped. 1921.

PROC. N. ENG. ZOÖL. CLUB, **7**, 1921, p. 107, pl. 5.
A fine example.

TYPHLOPS PALLIDUS (Cope). See LETHEOBIA PALLIDA Cope HOLOTYPE

TYPHLOPS PUSILLUS Barbour HOLOTYPE AND PARATYPES

8719. One. Cape Haitien, Haiti. W. M. Mann. Mus. Exped. 1913.
8755. One. Emery, Haiti. W. M. Mann. Mus. Exped. 1913.
8773. One. Cape Haitien, Haiti. W. M. Mann. Mus. Exped. 1913.
8774–75. Two. Grand Riviére, Haiti. W. M. Mann. Mus. Exped. 1913.

MEM. MUS. COMP. ZOÖL., **44**, 1914, p. 323.
A finely preserved series.

TYPHLOPS SUDANENSIS Schmidt PARATYPE

13599. One. Faradje, Belgian Congo. Lang-Chapin Exped. Exch. Amer. Mus. Nat. Hist. 1920.

BULL. AMER. MUS. NAT. HIST., **49**, 1923, p. 51, fig. 2.
Good example.

TYPHLOPS ULUGURUENSIS Barbour and Loveridge HOLOTYPE AND PARATYPES

23080. One. Nyange, Uluguru Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.

23081–82. Two. Nyange, Uluguru Mts., Tanganyika Territory. A. Loveridge. T. Barbour. 1927.

MEM. MUS. COMP. ZOÖL., **50**, 1928, p. 104.
Good condition.

TYPHLOPS WILDERI Garman COTYPES
= HELMINTHOPHIS WILDERI (Garman)

5126, 18138, 19585. Three. São Cyprião, Minas Geraes, Brazil. J. G. Branner. B. G. Wilder and Cornell Univ. Mus. 1883 and 1924.

SCIENCE OBSERVER, **4**, 1883, p. 48.
Well-preserved specimens.

TYPHLOSAURUS AURANTIACUS Peters COTYPE

21046. One. Inhambane, Mozambique. W. Peters. Exch. Zoöl. Mus. Berlin. 1925.

MONATSBER. AKAD. WISS. BERLIN, 1854, p. 620.
A fine example.

UNGUALIA CURTA Garman HOLOTYPE
= TROPIDOPHIS PARDALIS CURTUS (Garman)

6114. One. Cuba.

PROC. AMER. PHIL. SOC., **24**, 1887, p. 279.
Miss Olive G. Stull in her recent (1928) revision of this genus revives Garman's *curta* from the synonymy of *T. pardalis* making it a subspecies. She considers the locality "Cuba" doubtful as it conforms to New Providence, Bahaman specimens but gives the range as "New Providence Island, Bahamas and possibly Cuba."

UROMACER DORSALIS Dunn HOLOTYPE

12867. One. La Gonave Id., Haiti. G. M. Allen. Mus. Exped. 1919.

PROC. N. ENG. ZOÖL. CLUB, **7**, 1920, p. 43.
Somewhat hardened but perfect.

UROMACER FRENATUS Günther. See UROMACER INORNATUS Garman COTYPES

UROMACER INORNATUS Garman COTYPES
= UROMACER FRENATUS Günther

3345. Two. Jeremie, Haiti. P. R. Uhler. P. R. Uhler. 1865.
3610. Two. Jeremie, Haiti. D. F. Weinland. Purchased. 1859.

PROC. AMER. PHIL. SOC., **24**, 1887, p. 284.
One or two not really well preserved.

UROTHECA LATERISTRIGA (Berthold). See DROMICUS TEMPORALIS Cope HOLOTYPE

UTA SLEVINI Van Denburgh PARATYPE

16779. One. Mejia Id., Gulf of California, Mexico. J. R. Slevin. Exch. Calif. Acad. Sci. 1922.

OCC. PAPERS CALIF. ACAD. SCI., **10**, 1, 1922, p. 194.
Excellent specimen.

VARANUS PUNCTATUS ORIENTALIS (Fry). See VARANUS PUNCTATUS *var.* ORIENTALIS Fry COTYPE

VARANUS PUNCTATUS *var.* ORIENTALIS Fry COTYPE
= VARANUS PUNCTATUS ORIENTALIS (Fry)

10267. One. Eidsvold, Upper Burnett R., Queensland, Australia. Exch. Austr. Mus. 1914.

REC. AUSTRALIAN MUS., **10**, 2, 1913, p. 18, figs.
A fine specimen but rather young.

VERTICARIA CERALBENSIS Van Denburgh and Slevin PARATYPE

16839. One. Ceralvo Id., Gulf of California. J. R. Slevin. Exch. Calif. Acad. Sci. 1922.

PROC. CALIF. ACAD. SCI., **11**, 1922, p. 396.
A fine example.

VIRGINIA INORNATA Garman COTYPES
= POTAMOPHIS STRIATULUS (Linné)

2453. Two Dallas, Texas, U. S. A. Mr. Boll. Mr. Boll. 1870.

MEM. MUS. COMP. ZOÖL., **8**, 1883, p. 97.
Good examples.

VOELTZKOVIA MIRA Boettger COTYPES

7750, 17637–39. Ten. Majunga, Madagascar. A. Voeltzkow. Exch. Senck. Mus. 1911 and 1923.

KATAL. SENCKENB., **1**, 1893, p. 116.
In excellent condition.

WETMORENA HAETIANA Cochrane PARATYPE

24536. One. Morne Cabaio, Massif de la Salle, Haiti. Alexander Wetmore. U. S. Nat. Mus. 1927.

PROC. BIOL. SOC. WASH., **40**, 1927, p. 91.
Good condition.

Woodworthia digitata Garman COTYPES OF GENUS AND SPECIES

6153. Two. New Zealand. Edwards. Edwards. 1879.

BULL. MUS. COMP. ZOÖL., **39**, 1901, p. 4, pl. 1, figs. 2–2 f.
In good order.

Xenodon suspectus Cope HOLOTYPE
= Ophis suspectus (Cope)

3649. One. Lake José Assú, Brazil. L. Agassiz. Thayer Exped. 1864–65.

PROC. ACAD. NAT. SCI. PHILA., 1868, p. 133.
An old soft specimen but in useful condition.

Xenopholis scalaris (Wucherer). See Gerrosteus prosopis Cope COTYPE

Zonosaurus rufipes (Boettger). See Gerrhosaurus (Cicigna) rufipes Boettger COTYPE

Zonurus namaquensis Methuen and Hewitt PARATYPE

22479. One. Great Karas Mts., S. W. Africa. P. A. Methuen. Exch. Transvaal Mus. 1926.

ANN. TRANSVAAL MUS., **4**, 1914, p. 137.
Good condition.

Zonurus tropidosternum Cope HOLOTYPE

5724. One. "Madagascar." Essex Inst., Salem. 1886.

PROC. AMER. PHIL. SOC., **11**, 1869, p. 169.
In good condition. The locality is incorrect; the lizard no doubt came from the mainland opposite Zanzibar.

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BIRDS OF THE CAYO DISTRICT, BRITISH HONDURAS

BY OLIVER L. AUSTIN, JR.

CAMBRIDGE, MASS., U. S. A.:
PRINTED FOR THE MUSEUM
SEPTEMBER, 1929

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OF THE

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No. 11.— *Birds of the Cayo District, British Honduras*

By Oliver L. Austin, Jr.

A substantial contribution toward the expenses of the Mason-Blodgett Expedition from the William and Adelaide Barbour Fund made it possible for me to accompany Mr. Gregory Mason to Central America during the spring of 1928. The main purposes of the expedition were archaeology and ethnology, but it was considered that, in as much as the route lay through a region so interesting and so little worked ornithologically, the opportunity for research in this field should not be neglected.

On March 15, 1928, Mason and I left Belize, British Honduras, for El Cayo, which we reached March 18, traveling up the Belize River by motor launch. I spent the next three days collecting there, while Mason observed and studied a Maya religious fiesta at the neighboring villages of Succotz and Benque Viejo. The fiesta finished, Mason intended to spend most of his time moving about from village to village by pack train, studying the native Indian tribes.

It is nearly impossible to study birds, when one must needs spend one's whole day in the saddle on a short-gaited mule, so it behooved me to find some more permanent base from which to work. The Mengel Mahogany Company was more than hospitable, and made me very comfortable for two weeks at their headquarters at Camp 6, about twelve miles south of El Cayo. For their many kindnesses to me, I shall always feel indebted to the manager and his wife, Mr. and Mrs. S. Williams.

Mr. John Eric Sydney Thompson, of the Captain Marshall Field First Archaeological Expedition to British Honduras, was at that time excavating a site he had discovered near Mountain Cow Water Hole, an abandoned mahogany camp some eight miles farther south from Camp 6. Eight miles and back again in that country is a full day's journey, and as Thompson's sole human company until then had consisted of seven stoical Indian workmen, he asked me to join him. This I gladly did, and spent the next two weeks collecting deep in the rain forest, while Thompson excavated his tombs and temples.

Gregory Mason visited us April 20, with the news that he had discovered some interesting limestone caves in the Great Southern Pine Ridge which he intended exploring more thoroughly. I packed up again and journeyed with him to a place near Augustine, where we camped

in a small oak grove on the icy little Rio Frio. A week's work saw Mason finished, and as our allotted time was rapidly drawing to a close, we ruefully headed back on April 28 for Cayo, Belize and home.

Ecology of the Region

British Honduras has two distinct seasons yearly, a rainy and a dry, and is considered to be entirely within the tropical zone. As my visit was during the dry period, there were but three light showers during the entire time I was there. That part of the Cayo district in which I worked, from Cayo south, has never been mapped or scaled with any remarkable degree of accuracy, so my figures for distances and heights are only estimates. I judged the directions and distances, besides from native hearsay, by my pocket compass and the length of time it took to traverse them. The altitudes I estimated as well as I could with a pocket aneroid barometer.

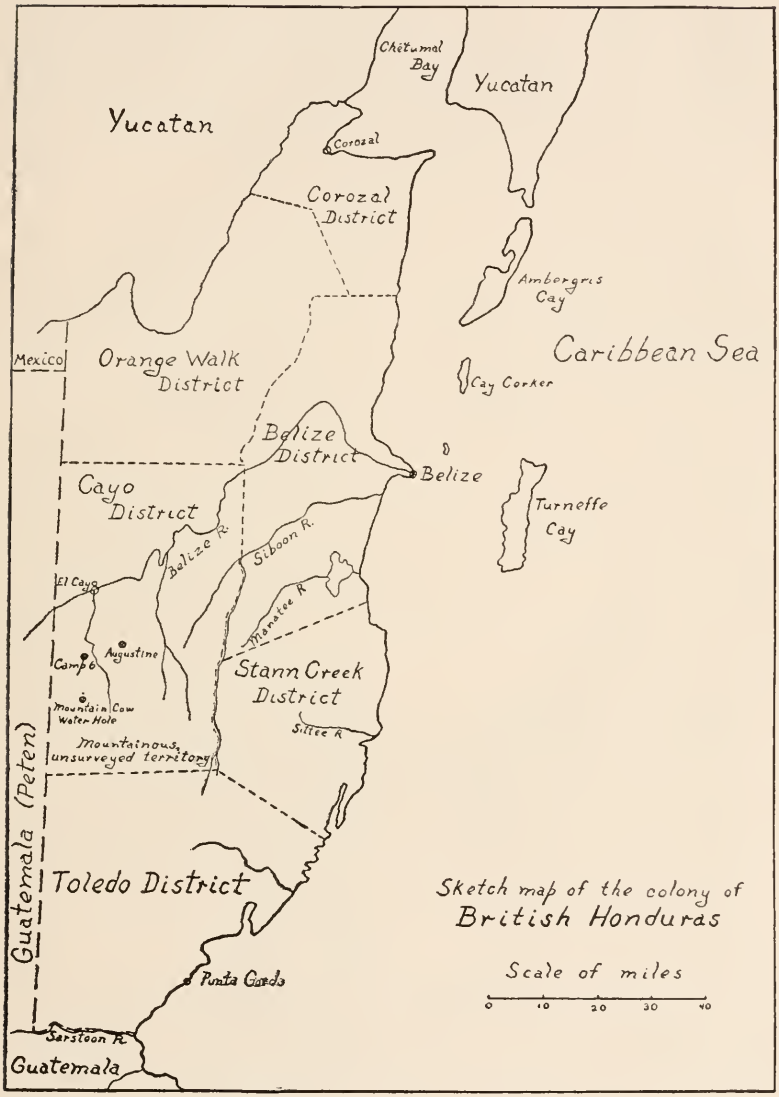
El Cayo is supposedly 500 feet above sea level. It consists mainly of man-made clearings with most of the heavy forest cut away, though there are a few patches of bush left in places.

As one goes southward the country rises rapidly, and I estimated Camp 6 to be about 1,800 feet in altitude. Here is plenty of forest, but the camp itself sits in the middle of an extensive clearing, somewhat wilder than the corresponding areas at Cayo. The east branch of the Belize River is two miles distant at its nearest point, and just on the other side of it, to the eastward, starts the Great Southern Pine Ridge.

Mountain Cow Water Hole (Mountain Cow = Tapir) lies still deeper in the forest, and its altitude is about 2,000 feet. At the time of my visit it had been abandoned by the loggers for over two years, and the rank vegetation had already claimed most of its own land back again. The lumbering operations had cut away most of the mahogany, but the rest of the jungle was left unimpaired, the trees averaging upwards of 150 feet in height. There is no stream near Mountain Cow, and the tiny, slimy, green *aguada* from which we took our drinking water threatened daily to dry up completely and force us to evacuate the site.

Augustine, about twelve miles southeast of El Cayo, rises about 2,200 feet above the level of the sea. It is in the open pine ridge country, but borders closely on the smaller rain forest areas which project in irregular peninsulas, capes and promontories through the pines.

If we neglect the immediate banks of the larger rivers, which boast several species not found elsewhere such as Herons and Kingfishers,


Chetumal Bay
Yucatan
Yucatan
Corozal
Corozal District
Ambergris Cay
Caribbean Sea
Mexico
Orange Walk District
Cay Corker
Belize District
Belize
Cayo District
Turneffe Cay
Belize R.
Siboon R.
El Cayo
Manatee R.
Augustine
Camp 6
Stann Creek District
Mountain Cow Water Hole
Sittee R.
Mountainous, unsurveyed territory
Guatemala (Peten)
Toledo District
Punta Gorda
Sarstoon R.
Guatemala
Sketch map of the colony of British Honduras
Scale of miles
0 10 20 30 40

the district may be divided naturally into the three life areas which I term (a) the rain forest, (b) the transition, and (c) the pine ridge.

The rain forest area is typical of that found all through Central America, mahogany and the various species of chicle trees forming the bulk of it, the mass tied together by a thick, tangled network of palm underbrush and lianas that almost defies penetration.

List of birds typical of the rain forest area: —

Tinamus m. robustus
Crypturus b. boucardi
Crax globicera
Odontophorus g. guttatus
Sarcorhamphus papa
Clamosocircus g. guerilla
Aratinga a. astec
Amazona farinosa guatemalae
Pionus senilis
Hylomanes momotula
Momotus l. lessonii
Phaethornis l. longirostris
Agyrtria candida
Trogon puella
Trogon c. caligatus
Trogon m. melanocephalus
Trogon m. massena
Rhamphastos p. piscivorus
Pteroglossus t. torquatus
Aulacorhynchus p. prasinus
Chloronerpes rubiginosus yucatanensis
Tripsurus pucherani perileucus
Veniliornis oleaginus sanguinolentus
Scapaneus g. guatemalensis
Microrhopias quixensis boucardi
Thamnistes a. anabatinus
Rhamphocaenus r. rufiventris
Formicarius analis intermedius
Automolus ochrolaemus cervinigularis
Xenops minutus mexicanus
Dendrocincla a. anabatina
Dendrocincla h. homochroa
Sittasomus s. silvioides
Xiphocolaptes e. emigrans
Lepidocolaptes souleyetii pallescens
Xiphorhynchus f. flavigaster
Dendrocolaptes certhia sancti-thomae
Platyrinchus cancrominus
Oncostoma cinereigulare
Onychorhynchus m. mexicanus
Pipra m. mentalis
Manacus candei
Scotothorus v. verae-pacis
Tityra semifasciata personata
Heleodytes zonatus restrictus
Pheugopedius m. maculipectus
Henicorhina p. prostheleuca
Turdus g. grayi
Turdus assimilis parcolor
Polioptila s. superciliaris
Pachysylvia decurtata
Pachysylvia o. ochraceiceps
Cyanocompsa c. concreta
Arremenops striaticeps chloronotus
Arremon aurantiirostris saturatus
Cyanerpes c. cyaneus
Chlorophanes spiza guatemalensis
Tanagra gouldi
Habia rubica rubicoides
Habia s. salvini
Lanio aurantius
Zarhynchus wagleri mexicanus
Gymnostinops montezuma
Icterus prosthemelas
Psilorhinus mexicanus cyanogenys

The transition area usually covers a narrow strip between the rain-forest and the pine ridge areas. It is fairly open country with trees,

shrubs and bushes, usually smaller than the vegetation on either side. It contains neither the pines of the pine ridge nor the tangled, thick masses of dank undergrowth and lianas of the rain forest, and though birds typical of these other two areas occasionally stray into it, it boasts a characteristic avifauna all its own. Here are found those species which are typical of the clearings, and it is only logical to suppose that this is the ancestral home from which many of the birds now common to the richer areas made by the hand of man have radiated.

List of birds typical of the transition area: —

Ortalis vetula jalapensis
Chaemepelia passerina subsp.
Claravis p. pretiosa
Coragyps a. atratus
Cathartes a. aura
Falco s. sparverius
Ictinea plumbea
Nyctidromus albicollis sumichrasti
Amazilis cyanocephala guatemalensis
Piaya cayana thermophila
Crotophaga sulcirostris
Microrhopias quixensis boucardi
Pipromorpha oleaginea assimilis
Myiodynastes l. luteiventris
Pachyramphus cinnamomeus
Heleodytes zonatus restrictus
Volatinia jacarini atronitens
Caryothraustes p. poliogaster
Saltator a. atriceps
Tanagra elegantissima
Tanagra olivacea humilis
Tanagra hirundinacea
Tangara l. larvata
Thraupis abbas
Piranga testacea figlina
Piranga l. leucoptera
Icterus m. mesomelas
Dives dives
Xanthoura luxuosa guatemalensis

The pine ridge area is a joy forever, especially after several weeks in the rain forest during the dry season. It consists of open savannahs with regularly spaced, large, majestic pines, with small clumps of palmettos here and there, and once in a while a grove of oaks. The whole district is cut by roaring, cool little streams that would surely be trout brooks farther north, but which here contain nothing but the little fingerling fry which the natives call "Billums," and which serve but one good purpose, that of eating the ticks from one's back.

List of birds typical of the pine ridge area: —

Ictinea plumbea
Amazona a. autumnalis
Chordeiles minor henryi
Balanosphyra formicivora albeola
Megarynchus pitangua mexicanus
Chamaethlypis poliocephala palpebralis
Basileuterus c. culicivorus
Basileuterus ruficollis salvini
Aimophila r. rufescens
Spizella socialis pinetorum
Icterus giraudii

The birds of the region in general show many intergrade characters. Although I did not reach any heights great enough to allow much change for altitudinal reasons, many of the specimens I collected show slight, though apparent differences from their strictly lowland equivalents. Most of the young, aggressive species, which vary subspecifically over wide ranges, have been studied, compared and named from the districts surrounding British Honduras, from Vera Cruz, Yucatan, Guatemala or Honduras. Their representatives here are mostly mild intermediates between these surrounding named races, showing varied tendencies in many directions. For the most part, they do not set themselves apart strongly enough to warrant further separation, though many of them are difficult to assign definitely to any of the described forms. As a whole they most closely resemble those of the Vera Cruz, southern Mexico and northern Guatemala regions, though a few families have affinities toward groups from farther south.

It is strange that British Honduras, as a separate political region, has received so little attention ornithologically. The appended bibliography, while by no means complete, contains most of the more important titles under which references to the bird life of the district may be found. The only works that make any attempt to deal with the avifauna of the colony as a whole are Salvin and Godman's Aves, and, as far as they go, Ridgway's Birds of North and Middle America and Cory and Hellmayr's Birds of the Americas. The rest of the papers listed are for the most part comparatively short ones, dealing either with descriptions of new forms, or occurrences of certain rare species. While there have been several good collections made in the region, none of them have been reported on in full, the usual procedure being to select solely the more important material, omitting any reference to the commoner forms for the sake of brevity. Because of this there are many common species that have not been recorded from the colony to date, though they are undoubtedly represented by British Honduras specimens in museums both in this country and abroad. It is ludicrous to be able to find no records in literature for the occurrence there of such common species as the three Vultures, the Gartered Trogon, the Lovely Cotinga, several Tanagers, and a dozen North American migrants. So, while it is not my purpose in this paper to list all the birds known to occur in British Honduras, I do intend to report as fully as possible my own ornithological experiences there. I find almost twenty-five per cent, or to be exact, 40 out of the 157 species and subspecies represented in my collection and field notes, to have never before been recorded from the district.

List of species recorded in this paper hitherto unreported in literature as occurring in British Honduras: —

1. Crax globicera
2. Charadrius semipalmata
3. Pisobia fuscicollis
4. Actitis macularia
5. Ardea herodias
6. Sarcorhamphus papa
7. Coragyps a. atratus
8. Cathartes a. aura
9. Asturina p. plagiata
10. Amazona farinosa guatemalae
11. Trogon c. caligatus
12. Myiochanes virens
13. Myiochanes pertinax minor
14. Cotinga amabilis
15. Stelgidopteryx ruficollis ridgwayi
16. Nannorchilus leucogaster musicus
17. Henicorhina p. prostheleuca
18. Hylocichla ustulata swainsoni
19. Polioptila s. superciliaris
20. Lanivireo flavifrons
21. Pachysylvia o. ochraceiceps
22. Dendroica a. aestiva
23. Dendroica pensylvanica
24. Dendroica fusca
25. Oporornis philadelphia
26. Oporornis formosus
27. Geothlypis t. trichas
28. Icteria v. virens
29. Chamaethlypis poliocephala palpebralis
30. Basileuterus c. culicivorus
31. Basileuterus ruficollis salvini
32. Aimophila r. rufescens
33. Spizella socialis pinetorum
34. Chlorophanes spiza guatemalensis
35. Tanagra elegantissima
36. Tanagra olivacea humilis
37. Piranga r. rubra
38. Habia r. rubicoides
39. Zarhynchus wagleri mexicanus
40. Icterus giraudii

Systematic List

TINAMIDAE

Tinamus major robustus Scl. & Salv.

Individuals identified at all three stations, and taken frequently for the pot, though none collected. It is the common Tinamou of the region, and can be heard whistling in the jungle at almost all times, though especially early in the morning.

Crypturornis boucardi boucardi (Sclater)

Female, Camp 6, March 24.

This is a rather uncommon bird, shy and retiring.

CRACIDAE

Crax globicera globicera Linn.

I heard this bird calling in the jungle not uncommonly, but found it very wary and difficult to approach. One killed in the small jungle near the pine ridge at Augustine, but not collected.

Ortalis vetula jalapensis Miller & Griscom

Adult male, Cayo District, Mountain Cow Water Hole, April 12.

My single specimen does not agree exactly with any of the geographically adjacent races, but is nearer *jalapensis* than any other. I saw four other specimens in the field, all killed by native hunters, but so badly shot that they could not be skinned. They seemed, on hasty examination at the time, not to differ a particle from the one preserved. There is one specimen in the Museum of Comparative Zoölogy of typical *plumbeiceps* from the Sittee River, a locality not a hundred miles from Mountain Cow. This bird is exceedingly fuscous and possesses bicolored rectrices, showing that the dividing line between the races must be rather sharp and narrow in this territory.

The bird is common, though shy. It was heard calling mornings and evenings in the edges of the clearings both at Camp 6 and Mountain Cow, making much noise and very little music.

ODONTOPHORIDAE

Odontophorus guttatus guttatus Gould

3, both sexes, Camp 6 and Augustine, March 27 to April 22.

These birds show slightly darker crests, chests, napes and shoulders, and lighter, less spotted rumps than the small series from Costa Rica with which I have compared them. However, there is not enough material at hand to establish a northern race definitely, though perhaps such may be done when specimens from the intervening localities become available. Ridgway (Proc. U. S. nat. mus., **16**, 1893, p. 469) describes such a northern race as *O. consobrinus* which, from his description, seems to be a female *guttatus* from Vera Cruz.

COLUMBIDAE

Columba nigrirostris Sclater

Male, Augustine, April 23.

PERISTERIDAE

Chaemepelia passerina subsp.

A Ground Dove was fairly common in the clearings round Camp 6, but none was preserved. The only four I shot went into the pot against orders, before I had a chance to skin them.

Claravis pretiosa pretiosa (Ferrari-Perez)

This pretty little Blue Ground Dove is seen in small flocks in the roads and clearings all through the rain forest.

Oreopelia montana (Linn.)

Male, Augustine, April 22.

RALLIDAE

Aramides albiventris albiventris Lawrence.

Male and female, Belize River, March 16; female, Mountain Cow, April 18.

This large, handsome Rail is very common along the banks of the Belize River. In the course of a day's travel upstream in a motor boat we saw 35, in ones and twos. They feed on the open banks of the river, sometimes wading in the shallow water, and when disturbed by a passing boat retire quietly and unhurriedly into the bush. The single individual at Mountain Cow was taken in a small swamp deep in the rain forest, and was very shy, much more so than the birds along the main river.

CHARADRIIDAE

Charadrius semipalmatus Bonap.

I saw one lone bird on the Belize River, March 17.

Aegialitis vociferus (Linn.)

Flock of 20 seen on the Belize River, March 20.

Pisobia fuscicollis (Vieill.)

Flock of 40 seen on the Belize River, March 20.

Actitis macularia (Linn.)

Two seen on the Belize River, March 17, and 2 more, March 20.

ARDEIDAE

Ardea herodias herodias Linn.

One seen on the Belize River, March 17.

Florida caerulea (Linn.)

Common all along the Belize River, in both blue and white plumages.

Butorides virescens subsp.

Four seen on the Belize River, March 20.

CATHARTIDAE

Sarcorhamphus papa (Linn)

One killed at Mountain Cow, and several seen at Camp 6. They keep more to the heavy bush and are much shyer than the other vultures.

Coragyps atratus atratus (Meyer)

Common everywhere near the settlements and clearings.

Cathartes aura aura (Linn.)

Not uncommon anywhere *C. atratus* was found in numbers.

FALCONIDAE

Clamosocircus guerilla guerilla (Cassin)

Immature male, Augustine, April 24.

This bird was taken in the rain forest bordering the pine ridge. I saw and positively identified three others in the jungle. The species acts much like our northern Sharp-shinned Hawk, darting through the bush and striking quick and hard. I saw none in the open at all.

Falco sparverius sparverius Linn.

Common at Camp 6 in the clearings. One shot.

Elanoides forficatus subsp.

A single Swallow-tailed Kite high in the air over Cayo on March 17 was the only one seen.

Asturina plagiata plagiata Schlegel

One seen on the banks of the Belize River, March 16, perched on and tearing up an iguana lizard it had just killed.

Ictinea plumbea (Gmelin)

Male and female, Mountain Cow, April 14, Augustine, April 21.

This is the common Kite of the region. It loiters about the wilder clearings, but its favorite haunt is the open pine ridge. In that area there are always from two to twenty in sight. They like to perch on dead limbs at the summits of the tall pines, and are remarkably unsuspicious and unafraid of man. One can walk under a tree on which they are perched at any time without their taking flight.

BUBONIDAE

Glaucidium brasilianum ridgwayi Sharpe

Male, Augustine, April 24.

PSITTACIDAE

Aratinga astec astec (Souancé)

1 male and 1 female, Camp 6, March 24; 1 male, Mountain Cow, April 13.

Very common everywhere in the rain forest, usually staying in the tops of trees of medium height, though I surprised one band feeding in low bushes in a clearing.

Amazona farinosa guatemalae (Schlegel)

Not uncommon in the tall jungle, usually occurring in pairs of small flocks. I saw one flock of twenty near Mountain Cow. It is highly prized by the natives as food because of its size, but was promptly rejected by ourselves for that purpose, because of its toughness.

Amazona autumnalis autumnalis (Linn.)

1 male, Pine Ridge, March 29.

Several others seen, always in the pine ridge close to the forest.

Pionus senilis (Spix)

1 male, Camp 6, March 23.

This Parrot was one of the commonest and most noticeable birds at Mountain Cow, screaming continually from the tops of the tallest trees, and usually going in large flocks. Because of its extreme abundance, it is one of the main food birds of the natives.

ALCEDINIDAE

Megaceryle torquata torquata (Linn.)

Common on the Belize River.

Megaceryle alcyon subsp.

Four seen on the Belize River, March 17.

Chloroceryle amazona (Lath.)

Common on the Belize River.

Chloroceryle americana isthmica Goldman

1 male, Camp 6, March 26.

Very common on the Belize River. There is a perfect intergradation between *isthmica* and *americana* all the way from Panama to Texas, so that it is difficult to assign birds of certain areas to either race with certainty. My specimen and several others I have seen from British Honduras are not typical of either race, but seem nearer *isthmica* than *americana*.

MOMOTIDAE

Hylomanes momotula Licht.

Rare. One blown apart at close range at Mountain Cow, April 18.

Momotus lessonii lessonii Less.

1 male, Mountain Cow, April 17.

The races of *Momotus lessonii* are difficult to differentiate unless one has a large series at hand, so that extremes may be chosen for comparison. There is a perfect intergradation from *lessonii* of Panama to

caeruleiceps of northern Mexico. As Chapman suggests (Bull. Am. mus. nat. hist., 1923, p. 34) the form *aequatorialis* of Colombia is a race of *lessonii*, but the strange thing is its apparent affinity for the southern Mexican bird rather than its nearest neighbor in Panama. Elevation above sea-level may explain this, the birds following the mountain ranges, and going higher the farther south the species goes. The Colombian bird is an extreme highland form, while the southern Mexican bird is one of lowlands and mid-altitudes.

My specimen from Mountain Cow, and two I have examined from the Toledo District, approach *goldmani* in having less violet and more black in the posterior part of the nuchal crest than typical *lessonii* of western Nicaragua, but the birds have to be in large series to show it at all. In this race, as in many others, the Cayo district seems to be an intermediate zone between Mexican and Honduranian subspecies, sometimes approaching one, sometimes the other, but nearly always of too little distinctive value to warrant separation.

CAPRIMULGIDAE

Chordeiles minor henryi Cassin

1 female, Augustine, April 26.

Nyctidromus albicollis sumichrasti Ridgway

2 males, Camp 6, March 31, Augustine, April 21.

The Cueijo sang loud and long everywhere every damp, foggy night. My two birds belong apparently to the Mexican race.

TROCHILIDAE

Phoethornis longirostris longirostris (Delattre)

1 female, 2 males, Mountain Cow, April 14.

My birds seem to belong to the Guatemalan race, having buffy in the margins of the lateral retrices, but they are closer to *veraecrucis* than are southern Guatemalan birds, as they show the buffy less strongly, and have a slight margin of white on the extreme tips of the lateral rectrices, outside the buffy.

Agyrtria candida (Bour. & Muls.)

2 males, Mountain Cow, April 14.

Amazilis tzacatl tzacatl (De la Llave)

1 male, Monkey Run, Belize River, March 16; female, Cayo, March 17.

Amazilis cyanocephala guatemalensis (Gould)

1 male and 1 female, Augustine, April 23.

TROGONIDAE

Trogon puella Gould

1 female, Mountain Cow, April 7.

Trogon caligatus caligatus Gould

1 male and 1 female, Camp 6, March 26–30.

Trogon melanocephalus melanocephalus Gould

1 male, Mountain Cow, April 18.

Trogon massena massena Gould

1 male, Augustine, April 23.

This is the commonest Trogon in the region.

CUCULIDAE

Piaya cayana thermophila Sclater

3 males, Cayo, Camp 6, Mountain Cow.

Very common everywhere in the rain forest area.

Crotophaga s. sulcirostris Swains.

1 female, Cayo, March 19.

Very common in the bushes along the roads and in the clearings. Called by the natives the "blacksmith," probably because of its color, and because it is always making a noise.

RHAMPHASTIDAE

Rhamphastos piscivorus piscivorus Linn.

1 male and 1 female, Camp 6, March 23.

This Toucan is very common in the high forest. Its croaking is not loud, but carries an astonishing distance. Called by the natives "De Beel Burd."

Pteroglossus torquatus torquatus (Gmelin)

1 female, Camp 6, March 26.

Not uncommon, though always seen in lone high trees in the clearings and never in the forest proper.

Aulacorhynchus prasinus prasinus (Gould)

2 males, Mountain Cow, April 15.

Several others seen the same day and on the two following days, but none at any other time. It is a bird one cannot help noticing, if in the vicinity, so these may have been migrating.

BUCCONIDAE

Malacoptila panamensis inornata (Du Bus)

1 female, Augustine, April 25.

This bird with two other females and two males from the Toledo District in the collections of the Museum of Comparative Zoölogy are much lighter than a series of *inornata* from Costa Rica. The type locality of the race is Guatemala, and my birds can scarcely be told from a small series of old trade skins from somewhere in that republic, except that the white spots in the back seem a little lighter in my birds, a difference which may be due to the age of the skins. Without good Guatemalan material, nothing can be done, but there is surely a subspecific difference between the races of this species found respectively in Costa Rica and in Guatemala and British Honduras.

PICIDAE

Piculus rubiginosus yucatanensis (Cabot)

1 male and 1 female, Cayo, March 18 and 19.

Balanosphyra formicivora albeola (Todd)

2 males and 3 females, all in the pine ridge, 3 near Camp 6, March 29, and 2 at Augustine, April 24–25.

These birds are identical with Todd's well-marked race from the Manatee Lagoon. He supposed that the race was coastal, and these

are the first to be taken since. It is very common in the pine ridges, and is one of the most typical species of that area. It keeps to the tops of the tall pines, but is conspicuously colored and very noticeable.

Tripsurus pucherani perileucus (Todd)

2 males and 1 female, Mountain Cow, April.

In Todd's description of this form he gives as characters, broader white markings on the back, more white on the secondary coverts coming farther forward, and less restricted red on the belly. Of these the only one that seems to hold is the white on the secondary coverts. The others vary greatly and are apparently not diagnostic.

Centurus dubius dubius (Cabot)

1 unsexed, Camp 6, March 21.

Veniliornis oleaginus sanguinolentus (Sclater)

1 female, Mountain Cow, April 12.

Celeus castaneus (Wagler)

1 male, Mountain Cow, April 15.

This specimen shows the lighter colored head of the spring bird.

Scapaneus guatemalensis guatemalensis (Hartlaub)

1 male, Mountain Cow, April 12.

Very common, in the large forest, usually seen on the lower trunks of big trees. It is very tame, and can be approached closely with ease.

FORMICARIIDAE

Thamnophilus doliatus mexicanus Allen

1 female, Cayo, March 18.

A fully adult bird, with almost none of the black barring that typifies the juvenal, but very small and very ruddy, both on the back and the breast. The wing measures 66 mm., the culmen 20 mm. More specimens from the Cayo district, especially a series of adult males, would undoubtedly prove of interest.

Thamnistes anabatinus anabatinus Scl. & Salv.

1 male, Mountain Cow, April 4.

Microrhopias quixensis boucardi (Sclater)

4 males, one female, Camp 6, March 25, Mountain Cow, April 6–15, Augustine, April 23.

Rather common, inhabiting the bushes by the trails.

Rhamphocaenus rufiventris rufiventris (Bonap.)

1 male, Mountain Cow, April 10.

Formicarius analis intermedius (Ridgway)

1 male, Mountain Cow, April 7.

This bird is very shy. The only one I collected I heard calling, stalked very carefully, and shot, thinking it a rail.

DENDROCOLAPTIDAE

Automolus ochrolaemus cervinigularis (Sclater)

2 females, Camp 6, March 27–31; 1 male Mountain Cow, April 5; 2 males, Augustine, April 23.

Xenops minutus mexicanus Sclater

Male, male, female, Mountain Cow, April 4–6–10; male, male, Augustine, April 23–25.

As he could not separate birds from the Manatee Lagoon from *mexicanus*, Hellmayr (Cat. Birds of America, pt. 4, 1925, p. 238) does not recognize *cayoensis* described by Chubb from Cayo (Bull. B. O. C., **39**, 1919, p. 52). Chubb's description was based on old, faded skins taken thirty-one years before his examination, and he neglected to take the age of his specimens into consideration. The large series in the Museum of Comparative Zoölogy shows a great variation in color, caused solely by fading with time. Using nothing but comparatively fresh skins, there is a gradual transition from *mexicanus* on the north in Vera Cruz, through British Honduras, Guatemala and northern Honduras, to *ridgwayi* in Panama on the south, the latter ranging

north to Costa Rica, Nicaragua and southern Honduras. Perfect intergrades may be found all along the way, and birds taken a hundred miles apart cannot be differentiated with certainty. My birds seem very slightly darker and less rufous than the Vera Cruz form, and much lighter than Costa Rican specimens. This is only what one would expect under the circumstances, and there is certainly no reason for recognizing a very poor race as close to the type locality of another as my birds are to *mexicanus*.

Dendrocincla anabatina anabatina Sclater

1 female, Mountain Cow, April 11.

Dendrocincla homochroa homochroa (Sclater)

4 males, Augustine, April 23.

Taken in small rain forest at the edge of the pine ridge. I saw two others the same day, and no more at any other time.

Sittasomus griseicapillus sylvioides Lafresnaye

2 males, Mountain Cow, April 5–12; female, Augustine, April 22.

My specimens are somewhat intermediate between this race and Bangs and Peters' new subspecies from Yucatan and the seacoast of British Honduras, though far nearer the former, differing only in being slightly paler rufous on the back and tail.

Xiphocolaptes emigrans emigrans Scl. & Salv.

1 male and 1 female, Mountain Cow, April.

Lepidocolaptes souleyetii decoloris new subspecies

Type.— Adult female, No. 140010 M. C. Z., British Honduras, Cayo district, El Cayo, March 18, 1928, O. L. Austin, Jr.

Specimens examined.— *L. s. decoloris*, 2 females, Cayo, male, Siboon River, British Honduras; *L. s. insignis* (Nelson), Vera Cruz 2, Toledo district, B. H. 2, Honduras 7, Guatemala 2; *L. s. compressus* (Cabanis), Costa Rica 44, Panama 8.

Subspecific characters.—Like *L. s. insignis*, but the buff of the throat

and the centers of the feathers of the head, nape, shoulders and breast much lighter, almost white; much as in *L. s. compressus*, but differing in having no black tips to the throat feathers; light centers to the feathers of the head, nape and shoulders, wider, and more developed on the back.

Measurements.— Type	female	Wing 97	Culmen 31
	female	Wing 89	Culmen 30
	male	Wing 96	Culmen 30

Range.— Highlands of British Honduras, Cayo district, western end of the Belize district, probably the northwest corner of the Toledo district and the eastern parts of Peten.

Remarks.— This little Thin-billed Woodhewer shows marked affinities with the race from Panama, Costa Rica and Nicaragua (*compressus*) rather than with the subspecies which surrounds it on at least three sides (*insignis*). Measurements are of little value, as they overlap, but with fresh skins for comparison the color differences seem reliable. This is presumably a mid-altitude form, but the new form may well prove to occur in northern British Honduras, Quintana Roo, and Peten.

Xiphorhynchus flavigaster flavigaster Swainson

3 males, 1 female, Mountain Cow, April 10–16–18–11.

This is the commonest Woodhewer of the district, occupying the ecological niche of and acting much like our northern Brown Creeper, though the two are, of course, in no way related.

Dendrocolaptes certhia sancti-thomae (Lafresnaye)

1 female, Mountain Cow, April 10; 1 male, Augustine, April 25.

TYRANNIDAE

Platyrinchus c. cancrominus Sclater and Salvin

1 male, Camp 6, March 31.

Todirostrum cinereum finitimum Bangs

1 unsexed, Belize River, Monkey Run, March 16.

ONCOSTOMA CINEREIGULARE (Sclater)

Female, male, male, male, Mountain Cow, April 8–11–17, Augustine, April 25.

This seems, when in the field, to be the smallest bird in the bush. The only adjective that describes its call and manner adequately is "explosive." The eye is whitish.

PIPROMORPHA OLEAGINEA ASSIMILIS (Sclater)

3 males, Mountain Cow, April 5–8–17; male, Augustine, April 25.

A Flycatcher of the medium-sized rain forest, haunting the tops of the smaller trees.

ELAENIA FLAVOGASTER SUBPAGANA Scl. & Salv.

Male, Augustine, April 24.

MYIOZETETES SIMILIS TEXENSIS (Giraud)

1 male, Camp 6, March 27.

Shot in a bush overhanging the Belize River.

MYIODYNASTES LUTEIVENTRIS LUTEIVENTRIS Sclater

Male and female, Camp 6, March 30; 3 males, Mountain Cow, April 5–13–17.

This is the common Flycatcher in the tops of the lower trees along the trails in the rain forest and at the edges of the clearings. It is a noisy, obtrusive bird, and makes itself very noticeable.

MEGARYNCHUS PITANGUA MEXICANUS (Lafresnaye)

1 male, Pine Ridge, March 27; 1 male and 1 female, Augustine, April 22.

This is the common large Flycatcher of the pine ridge area. It perches on the lower branches of the large pines, watching for insects.

ONYCHORHYNCHUS MEXICANUS MEXICANUS (Sclater)

1 male, Camp 6, March 30; 1 female and 1 male, Mountain Cow, April 7–10.

The two taken at Mountain Cow were just starting to build a nest in a bush about ten feet off the ground, overhanging a trail through the forest.

Myiobius sulphureipygius sulphureipygius (Sclater)

1 male and 1 female, Mountain Cow, April 11.

As Bangs points out (Proc. New Eng. zoöl. club, **4**, 1908, p. 27) the bird of British Honduras is slightly intermediate between this form from Vera Cruz and *M. s. aureatus* Bangs of southern Honduras and south. My two specimens are almost identical with the former.

Myiochanes virens (Linn.)

1 male and 1 female, Mountain Cow, April 10–16.

Myiochanes pertinax minor Miller & Griscom

1 female, Augustine, April 26.

This skin has such a small wing and short, wide bill that it cannot well be referred to *M. p. pertinax* (Cabanis & Heine) of Jalapa and Vera Cruz, though Salvin and Goldman (Aves, **2**, 1889, p. 81) list a specimen as such from Blancaneaux, Great Southern Pine Ridge, not ten miles from Augustine. I have not been able to compare it with other skins of the same species from British Honduras, or with any *M. p. minor* material from Nicaragua, but its measurements justify its reference to this race, despite the geographical incongruity. Adequate material may show a recognizable race from British Honduras, but as yet there are little or no grounds for attempting to establish one.

Myiochanes cinereus brachytarsus (Sclater)

1 male and 1 female, Belize River, March 16; 1 female, Cayo, March 19.

This Wood Pewee was not seen at all in the higher country.

Myiarchus tyrannulus nelsoni Ridgway

1 male, Camp 6, March 21.

Myiarchus tuberculifer connectens Miller & Griscom

1 female, Mountain Cow, April 9.

PIPRIDAE

Pipra mentalis mentalis Sclater

8, both sexes, Mountain Cow and Augustine, April 5 through 25.

Manacus candei (Parzudaki)

1 male, Camp 6, March 25.

Scotothorus verae-pacis verae-pacis (Sclater)

1 female, Camp 6, March 24; 2 males, Mountain Cow, April 6–7.

COTINGIDAE

Tityra semifasciata personata (Jardine & Selby)

1 male, Camp 6, March 24.

Several seen at Mountain Cow.

Pachyramphus cinnamomeus Lawr.

4 females, 1 male, Camp 6, March 30, Mountain Cow, April 4–5–6 (2).

They act like flycatchers, sitting on the tops of smaller trees.

Lathria unirufa unirufa (Sclater)

1 male, Mountain Cow, April 18.

Cotinga amabilis Gould

1 female, Camp 6, March 29.

Taken in the extreme top of a very tall tree at the edge of the pine ridge.

HIRUNDINIDAE

Stelgidopteryx ruficollis ridgwayi Nelson

1 female and 1 male, Augustine, April 23–25.

There was a small colony of Rough-winged Swallows nesting in holes in the ceiling of the huge limestone cavern through which the Rio Frio flows. It was impossible to reach the holes in the top of the cave into which the birds were disappearing to verify their breeding, though they were undoubtedly doing so. They are typical *ridgwayi*, large and very dark. My two specimens show the unreliability of the under tail-coverts as a determining factor, for the female possesses the dusky spots, while the male lacks them. (Cf. Bangs and Peters, Bull. mus. comp. zoöl., **67**, no. 15, January, 1925, p. 479).

Iridoprocne bicolor (Vieillot)

Common all along the Belize River and at El Cayo, March 17–18–19.

Iridoprocne albilinea (Lawrence)

Common all along the Belize River and at El Cayo.

TROGLODYTIDAE

Heleodytes zonatus restrictus Nelson

1 female, Camp 6, March 25; 1 male and 1 sex undetermined, Mountain Cow, April 16.

These birds, when compared with specimens from the Toledo district and from Guatemala show slightly paler bellies and less fuscous backs. However, they are in worn spring plumage, while the latter are all fall specimens, which may account for the difference.

The vociferous Cactus Wren is very common and very tame in the rain forest at Mountain Cow. I saw them daily playing about the low bushes around the camp, sometimes tearing thrasher-like through the thickets, at other times imitating Woodhewers on the tree-trunks, and never still for a moment.

Nannorchilus leucogaster musicus (Nelson)

1 male, Mountain Cow, April 4.

My single specimen shows gray rather than the fuscous flanks of the Vera Cruz race, and its under tail-coverts are white, sharply barred with black and dark brown, a condition found in none of the other nine specimens I have examined. In size, color of the back and banding of the tail my specimen agrees with the Vera Cruz bird rather than *brachyurus* of Yucatan, which the Quintana Roo birds approach. It is possible that more material from British Honduras and Guatemala may show a valid race from the highland region.

Pheugopedius maculipectus maculipectus (Lafresnaye)

2 males, Mountain Cow, April 9–15.

The British Honduras specimens of the Spotted-breasted Wren show intergradation with each of the three surrounding races, with all of which I have compared them. However, as they are nearest to the

Vera Cruz form, I have referred them there, rather than proposing a weak race on somewhat variable characters. The breasts of my two birds, and of two others from the Toledo district are slightly more heavily barred than *maculipectus*, but the shades of brown on the flanks, belly and back are decidedly less russet than in *umbrinus*. The pale Yucatan race, *canobrunneus*, is approached by four birds from southern Quintana Roo on the British Honduras boundary. My birds average midway in size between *maculipectus* and *umbrinus*, while those from southern Quintana Roo go on size to *canobrunneus*. All these characters are of such a nature that a series is necessary to show the difference.

Henicorhina prostheleuca prostheleuca (Sclater)

8, both sexes, all localities, March 31 to April 25.

This is the common Wren of the rain forest area, singing continually in the underbrush. It is found especially in heaps of old cut brush cleared from the trails beside these forest paths.

TURDIDAE

Turdus grayi grayi Bonaparte

1 male, Mountain Cow, April 17.

Two others seen April 22 on the road to Camp 6.

Turdus assimilis parcolor new subspecies

Type.—No. 140066 M. C. Z., adult male, British Honduras, Cayo district, Camp 6, March 26, 1928, O. L. Austin, Jr.

Range.— Highlands of British Honduras in the rain forest areas near the pine ridges of the Cayo and Toledo districts.

Subspecific characters.— Nearest to *T. a. oblitus* Miller and Griscom, but averaging slightly smaller; the male lighter gray on the back with a trace of olive; the female not distinguishable from the male; throats of both sexes containing less white and more black.

Specimens examined.— *T. a. parcolor*, male and female, Cayo district, male, Toledo district; *T. a. oblitus* Miller and Griscom, 6 males, 4 females, Costa Rica; *T. a. assimilis* Cabanis, 6 males, 5 females, eastern Mexico; *T. a. renominatus* Miller and Griscom, 5 males, 2 females, 1 sex undetermined, western Mexico; *T. a. leucauchen* Sclater, 1 imma-

ture, Guatemala (old trade skin); *T. a. cnephosa* (Bangs), large series, both sexes, Panama and Costa Rica.

Measurements.—	Male (type)	wing 113	culmen 21
	Male	wing 116	culmen 21
	Female	wing 113	culmen 20.5

Remarks.—Miller and Griscom (Am. mus. nov., no. 184, Sept. 24, 1925, p. 13) point out the possibility of the existence of an undescribed race of *Turdus assimilis* in British Honduras, but were unable to describe it themselves, through lack of material. They had at hand at the time all the available material in this country, and were able to give a very good revision of the races of this species. They point out that the geographically adjacent *leucauchen* is different from the British Honduras bird, but were unable to separate satisfactorily the four old skins they had of the latter from *oblitus*. My two fresh skins from the Cayo district and the male from the Toledo district, in the collections of the Museum of Comparative Zoölogy, all show the same color characters listed above, when compared with *oblitus*. Miller and Griscom, however, state that there seemed to be a sex difference in these birds from the specimens they saw. My pair show hardly any noticeable difference whatsoever, thus eliminating them as a synonym of either *leucauchen* or *oblitus*. My two fresh birds show a decidedly darker and more olive breast than *oblitus* or the Toledo district male, but this character may be variable.

On geographical grounds *parcolor* should be nearest either *leucauchen* or *assimilis*, so it is strange to find it approaching *oblitus*, especially as the much darker race *atrocinctus* of Nicaragua intervenes. The similar development of these two races must be a case of parallelism.

It is an unobtrusive little thrush, appearing in the field like a small, gray Robin. It prefers the rain forest, where it sings a song much like that of our northern Robin, though weaker and not as colorful.

Hylocichla ustulata swainsoni (Cabanis)

1 female, Augustine, April 26.

SYLVIIDAE

Polioptila superciliaris superciliaris Lawrence

1 male, Mountain Cow, April 14.

VIREONIDAE

Vireosylva olivacea (Linn.)

1 male, Camp 6, March 23; 1 female, Mountain Cow, April 17.

Lanivireo flavifrons (Vieillot)

1 female, Mountain Cow, April 14.

Pachysylvia decurtata (Bonap.)

1 male and 1 female, Mountain Cow, April 6–13.

Pachysylvia ochraceiceps ochraceiceps (Sclater)

1 male, 2 females, Mountain Cow, April 4–5–23; 1 male, Augustine, April 25.

MNIOTILTIDAE

Dendroica aestiva aestiva (Gmelin)

1 female, Belize River, Monkey Run, March 16.

Dendroica magnolia (Wils.)

Seen commonly in the clearings at Camp 6.

Dendroica pennsylvanica (Linn.)

Migrating in large numbers on the pine ridge, April 27.

Dendroica fusca (Müller)

One male, Augustine, April 21.

Migrating in large numbers.

Oporornis philadelphia (Wils.)

Mountain Cow, April 14.

Common everywhere.

Oporornis formosus (Wils.)

1 male, Mountain Cow, April 13.

Geothlypis trichas trichas (Linn.)

Very common at the Camp 6 clearings and in the transition area.

Icteria virens virens (Linn.)

1 female, Mountain Cow, April 7.

Chamaethlypis poliocephala palpebralis Ridgway

1 female, Augustine, April 24.

Wilsonia mitrata (Gmel.)

1 unsexed and 1 male, Mountain Cow, April 9–13.

Setophaga ruticilla (Linn.)

1 male, Mountain Cow, April 14. Very common in the rain forest.

Mniotilta varia (Linn.)

Common, migrating on the pine ridge.

Basileuterus culicivorus culicivorus (Lichtenstein)

1 female, Mountain Cow, April 11.

Basileuterus ruficollis salvini Cherrie

4, both sexes, Augustine, April 22–24–27.

FRINGILLIDAE

Cyanocompsa concreta concreta (Du Bus)

1 male, Camp 6, March 30.

Volatinia jacarini atronitens Todd.

1 male, Augustine, April 24.

Saltator atriceps atriceps Lesson

1 male, Cayo, March 16; 1 male, Mountain Cow, April 12.

Caryothraustes poliogaster poliogaster (Du Bus)

2 males, Augustine, April 25.

Spiza americana (Gmelin)

1 male and 1 female, Augustine, April 27.

The Dickcissel was common, migrating in small flocks on the pine ridge.

Aimophila rufescens rufescens Swainson

7, both sexes, Augustine, April 22–27.

Spizella socialis pinetorum (Salvin)

1 male and 1 female, Camp 6, March 27 to April 19; 11, both sexes, Augustine, April 19 through 27.

I saw this sparrow several times in the dry, dusty roads through the clearings, where it is not very common. Its favorite haunt is the pine ridge area, where it occurs commonly in large flocks.

Passerina cyanea (Linn.)

Very common in flocks in the clearings and the transition area.

Arremenops striaticeps chloronotus (Salvin)

1 female, Cayo, March 18.

This specimen is slightly larger than five other individuals of *chloronotus* from Quintana Roo and Guatemala, and the black crown stripes show no brown tinge whatsoever. The bird is subspecifically different from *A. s. centratus* Bangs, but hardly so from the race to which I refer it. The specimen shows beyond a doubt the relationship suspected by Todd (Proc. biol. soc. Wash., **36**, p. 41, March 28, 1923) between the so-called species *chloronotus* and the various races of *striaticeps*.

Arremon aurantiirostris saturatus Cherrie

1 female, Camp 6, March 26.

COEREBIDAE

Cyanerpes cyaneus cyaneus (Linn.)

1 male, Mountain Cow, April 18.

Chlorophanes spiza guatemalensis (Sclater)

1 male, 3 females, Mountain Cow, April 12.

TANGARIDAE

Tanagra elegantissima (Bonap.)

1 male, Mountain Cow, April 12.

Tanagra olivacea humilis (Cabanis)

1 male, Mountain Cow, April 17.

Tanagra hirundinacea (Bonap.)

8, both sexes, Camp 6 and Mountain Cow, March 24 to April 17.

Tanagra gouldi (Sclater)

1 male and 1 female, Mountain Cow, April 8.

Tangara larvata larvata (Du Bus)

2 males and 2 females, Mountain Cow, April 9–11 (2)–14.

A bird of the clearings and trail-edges, keeping in low, open trees.

Thraupis abbas (Lichtenstein)

9, both sexes, Mountain Cow and Camp 6.

Very common everywhere in the wilder parts of the clearings.

Ramphocelus passerinii Bonap.

1 male, Cayo, March 19.

Piranga rubra rubra (Linn.)

2 males, 2 females, Mountain Cow, April 5–11–11–18.

Piranga testacea figlina (Salvin & Godman)

1 male and 1 female, Augustine, April 22–26.

Topotypical material, found only at the edges of the pine ridge.

Piranga leucoptera leucoptera Trudeau

3 males, 2 females, Mountain Cow, April 5–17; male, Augustine, April 24.

My specimens show intergrading characters between this form and *P. l. latifasciata* Ridgway, the southern race, though they are much nearer to the former. The bands on the wing are a little wider than in

typical *leucoptera*, and the posterior wing band spreads over to the tips of the greater coverts, but at the same time they are not wide or extensive enough to be the southern form. Thus the northern and southern races are connected by an intergrade which I believe had best be left unnamed.

Habia rubica rubicoides (Lafresnaye)

1 male and 1 female, Mountain Cow, April 15–17.

Habia salvini salvini (Berlepsch)

2 females and 2 males, Camp 6, March 23–26–26–30.

Found only in the rain forest, but common there. A noisy bird, acting like a large finch, tearing through the underbrush in small bands and making various and sundry queer noises.

Lanio aurantius Lafresnaye

8, both sexes, Mountain Cow, April 4 through 16.

A bush inhabitant, rather quiet, preferring small trees and high bushes in the forest.

ICTERIDAE

Zarhynchus wagleri mexicanus Ridgway

1 male, Camp 6, March 25.

Gymnostinops montezuma (Lesson)

1 male, Mountain Cow, April 15.

A colony of these birds had their pendulous nest 100 feet high in a huge tree over our hut at the water hole.

Icterus galbula (Linn.)

1 male, Mountain Cow, April 13.

Icterus prosthemelas (Strickland)

1 male, Mountain Cow, April 17.

Icterus mesomelas mesomelas (Wagler)

3 males, 1 female, Camp 6, March 21 (2), April 29 (2).

The low bushes in the open clearing around Camp 6 were the only places where this bird was seen. It avoids the heavy forest.

Icterus giraudii Cassin

2 males, 2 females, Camp 6, March 27, 29 (2), Augustine, April 22.

Taken only in clumps of palmettos at the edge of the pine ridge near the rain forest.

Dives dives (Lichtenstein)

1 male, Mountain Cow, April 7.

Very common in all the clearings.

CORVIDAE

Xanthoura luxuosa guatimalensis (Bonaparte)

1 male, pine ridge near Camp 6, March 29.

Not common. Only two others seen, and these in the small dry forest at the edge of the pine ridge.

Psilorhinus mexicanus cyanogenys (Sharpe)

1 female, Camp 6, March 23.

The Brown Jay is very common throughout the rain forest highlands, and is distinctly the southern rather than the Vera Cruz race. The bird is a nuisance while one is collecting, as it shows the same curiosity and verbosity concerning man that our New England Blue Jay does. It is very tame, and will come within six feet of one, until its curiosity is satisfied. The negro natives call it the "Pium-pium" from its raucous call.

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AN ORNITHOLOGICAL SURVEY IN THE CARIBBEAN LOWLANDS OF HONDURAS

BY JAMES L. PETERS

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MUSEUM OF COMPARATIVE ZOÖLOGY

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No. 12.— *An Ornithological Survey in the Caribbean Lowlands of Honduras*

By James L. Peters

On the morning of 13 January 1928 Mr. Edward Bangs of Boston and I landed at Tela, Honduras, for the purpose of making an ornithological survey of the general region about Tela and particularly the Lancetilla Valley.

Here, in coöperation with Dr. Wilson Popenoe, Director of Agricultural Experiments of the United Fruit Company, various scientists, representing different fields of biological interests, have been invited to make field investigations under unusually favorable conditions.

At Tela we were met by Mr. Rufus K. Thomas, Division Manager, who welcomed us most cordially and placed practically the entire facilities of the company at our disposal. That same afternoon we were taken out to Lancetilla and assigned quarters and working space in a comfortable and well-equipped house, and mess privileges with the staff of the Experiment Station at the office about half a mile away.

The Lancetilla valley is the name now applied to the valley of the Tela River, a short stream originating in the hills about seven miles from the coast and flowing northward between two ridges that terminate rather abruptly about half a mile from the shore. The highest point on the ridge forming the eastern rim of the valley is about 1,800 feet, while the western side is little, if any, over 1,000 feet. The valley floor at the northern end, where it joins the coastal plain, is about three quarters of a mile in width, gradually becoming narrower towards the upper end, until it is no wider than the river itself. The lower reaches of the river are deep and sluggish, the middle stretches swift and shallow with a sandy bottom, while the upper portion is a mountain stream tumbling down the hillside over rocks and boulders. The flat portion of the valley, from its mouth to a point about four miles inland, has long ago been denuded of the forest. In its place were planted cocoanut palms, but these have also been removed and bananas substituted. With the development of land elsewhere more suited to bananas, the plantations in the valley have been abandoned and the land is reverting to characteristic second growth jungle. The northern ends of both east and west ridges have long ago been cleared and converted to pastures of guinea grass, and except for the gentler slopes or stream beds have remained in this condition. The western slopes have

likewise been cleared either for pasture or small farms for at least five miles inland, though there are a few patches of forest still remaining, and other portions have "reverted" to second growth jungle. The hills forming the eastern rim, together with the southern end of the valley, are completely clad in primeval rain forest. Rainfall at Lancetilla for 1926 was 136 inches; for 1927 128.76 inches.

A narrow gauge railway runs from Tela about four miles up the valley to the buildings of the experiment station; thence side trails continue on up the valley or back a short distance to the small clearings. A well-marked path also leads to the summit of the western rim. Bangs and I commenced our operations in this location 14 January and continued until 28 January. On the latter day we made a short trip to Progreso, a small Honduranian town in the Ulua valley, 88 kilometers westward from Tela on the Tela railroad. The railroad follows the coastal plain, crossing large areas of swamp land, pastures, new and abandoned banana plantations, until it reaches the Ulua River about fifteen miles from its mouth; it then swings up the wide level valley of that river, passing through more swamps, banana lands, new clearings and reverted land. There is little natural forest left within sight of the railroad. In fact the diminished rainfall in the country west of Tela has mitigated against the formation of a rain forest, and the woodland in the Ulua valley is more in the nature of a scrub forest, that has attained larger growth only where the supply of surface water was favorable. The rainfall at Progreso for 1926 was 68.15 inches; for 1927, 67.52 inches. We remained at Progreso only three days, returning to Lancetilla 1 February. Here we collected actively until 9 March, when we again went by the railroad to kilometer 52, where Mr. George Ascough was in charge of the digging of the Toloa canal, a project that has already drained a large area of marsh, and when it is completed will drain still more of the great Toloa swamp. This drainage project is for the purpose of reclaiming land to be used for further banana planting, but this cannot be done until the side drains are completed. In the meantime much of the vegetation has died off and floods have deposited large amounts of sediment, resulting in a wide expanse of mud flats interspersed with pools of stagnant water. In such situations water fowl of all sorts abound. Never in all my experience have I seen such numbers of Herons, or Wood Ibises as have flocked there to feed. But it can last only for a short time, as eventually these flats and marshy areas will be completely drained and planted to bananas. We remained at Mr. Ascough's camp until 12 March, when we once more returned to Lancetilla.

In addition to the two side trips especially mentioned, we visited the coastal plain section near Tela on several occasions. On 27 February we collected at Martinez Creek, a large area of swamp bordering the railroad 34 kilometers west of Tela, and on 28 February visited the Toloa lagoon. To reach the latter locality we took the railroad to a point about 30 kilometers west of Tela, and traveled by mule some four or five miles southward where we found vast grass marsh alternating with large areas of open water. It was here that we found Everglade Kites.

The great proportion of our time, however, we spent at Lancetilla, working all the different types of country and carrying on our efforts for about eleven weeks. At the time of our arrival the main part of the rains had ceased, although occasional showers fell. A severe "norther" accompanied by high wind and much rain took place 28–29 January and another on 19 February; during the course of the latter *temporal* over eleven inches of rain fell. From that time on, however, the weather was characteristic of the dry season, the showers becoming infrequent and the daily temperature averaging warmer.

On 2 April we sailed for the United States, arriving in Boston 9 April.

The ornithological history of Honduras is incomplete and fragmentary. No attempt has been made to list the birds recorded from that country in the way that Mr. Carriker has done for Costa Rica. Accounts dealing with collections made wholly or partly in Honduras have been published both in the United States and abroad, but most of such accounts have been rather in the nature of catalogues of collections, and practically none of them have taken into account the many factors now regarded necessary for consideration in preparing an intelligent account of the bird life of any region.

The following articles deal almost entirely with Honduras birds:

Parzudaki, Emile

1841. Rev. zoöl., p. 306. (Described *Pipra candei* from Truxillo, Honduras.)

Sclater, Philip Lutley

1858. List of birds collected by George Cavendish Taylor, Esq., in the republic of Honduras, Proc. zoöl. soc. London, p. 356–360. (Lists 39 species collected on a journey across Honduras from the Gulf of Fonseca to Omoa.)

Moore, Thomas J.

1859. List of birds and mammals collected by Mr. Joseph Leyland in Honduras, Belize, and Guatemala, Proc. zoöl. soc. London, p. 50–65 (Birds, p. 51–65. Annotated list of 125 species, 94 of which are credited

to Honduras, collected at Omoa, San Pedro, Chilomo, Comayagua, Chimalacon [= Chamelicon] River, Aloor [= Ulua] River. *Dendrocincla anabatina* and *Chloronerpes sanguinolentus* described as new by Sclater, types from Omoa, and *Ortyx leylandi* described as new by Moore, type from Flores, on the road from Omoa to Comayagua.)

Taylor, George Cavendish

1860. On birds collected or observed in the republic of Honduras, with a short account of a journey across that country from the Pacific to the Atlantic Ocean, Ibis, p. 10–24; 110–122; 222–228; 311–317. (Itinerary and collector's notes on habits or occurrence of 96 species of birds. The collection itself was reported on by Sclater in 1858.)

Sclater, P. L. and Osbert Salvin

1870. On birds collected by Mr. George M. Whitley on the coast of Honduras, Proc. zoöl. soc. London, p. 835–839. (A nominal list of 135 species represented by 520 skins from Puerto Cabello, Julian, Medina and San Pedro, with annotations on six of the species mentioned.)

Ridgway, Robert

1888. Catalogue of a collection of birds made by Mr. Charles H. Townsend on islands in the Caribbean Sea and in Honduras, Proc. U. S. nat. mus., **10**, p. 572–597. Pt. 3, Island of Ruatan, Honduras (3 species listed). Pt. 4, Truxillo, Honduras (56 species listed. *Thamnophilus intermedius, Centurus santacruzi pauper, Engyptila vinaceiventris* described as new). Pt. 5, Segovia River, Honduras (99 species listed. *Pitylus poliogaster scapularis, Sturnella magna inexpectata, Thalurania townsendi, Colinus nigrogularis segoviensis, Porzana exilis vagans* and *Tigrisoma excellens* described as new).

Salvin, Osbert

1888. A list of the birds of the islands off the coast of Yucatan and the bay of Honduras, Ibis, p. 241–265.

1889. Pt. 2, p. 359–379.

1890. Pt. 3, p. 84–95.

(Seventy-two species are credited to the islands of Ruatan and Bonacca, of which 42 are migrants. The account is based on the collecting of George F. Gaumer, and is practically the only source of our knowledge of the birds of the Bay Islands. The third island of this group, Utilla, lying about 25 miles off La Ceiba, seems never to have been visited by an ornithologist.)

Ridgway, Robert

1891. Notes on some birds from the interior of Honduras, Proc. U. S. nat. mus., **14**, p. 467–471. (This brief account was based on a collection of nearly 200 specimens representing 85 species, obtained in the "interior of Honduras" by Erich Wittkugel. *Platypsaris aglaiae hypophaeus* and *Pithys bicolor olivascens* are described as new. The plumages of the immature male and adult female of *Gymnocichla chiroleuca* Scl.

and Salv. and of the young male of *Grallaria guatemalensis* Prev. are described for the first time. Thirteen other species are mentioned "on account of the locality." Wittkugel's birds, as far as Ridgway mentions the seventeen species dealt with, came from San Pedro Sula, Santa Ana, Guaruma, Volcan de Puca, Chasniguas and Chamelicon.)

Bangs, Outram

1903. Birds and mammals from Honduras, Bull. mus. comp. zoöl., **39**, no. 6, p. 141–159. (Birds, p. 141–157. A catalogue of a collection of nearly 700 skins representing 127 species collected in a period of less than two months at La Ceiba and Yaruca by W. W. Brown. *Chloronerpes simplex allophyeus*, *Picumnus dimotus*, *Dendrornis nana confinis*, *Arremonops conirostris centratus* are described as new.)

The papers here listed are the only ones of which I have any knowledge, dealing with collections of birds from Honduras. Additional locality records from Honduras are to be found in the Biologia Centrali Americana, and in Ridgway's Birds of North and Middle America. In both cases such records appear to be based on specimens from small collections that have never been published on. In this category may be mentioned a collection of seventy-five skins representing 38 species formerly in the Bangs collection, now in the Museum of Comparative Zoölogy. These skins were made by an engineer on a boundary survey between Honduras and Nicaragua. They were collected along the boundary line between those two countries at a point about 180 miles from the Pacific coast; the date is not given, but the skins were purchased in 1901 from F. B. Webster and Company and at that time had only just come in. An Inca Dove from this collection served as the type of *Scardafella inca dialeucos* Bangs.

List of Species Collected or Observed

TINAMIDAE

Tinamus major robustus Scl. and Salv.

Tinamus robustus Sclater and Salvin, Exot. orn., 1868, p. 87, pl. 44 (Choctum, Guatemala).

Guangalola, Mountain Hen

An adult female was secured 24 January at about 1,800 feet in the forest clothing the hills on the southerly side of the Lancetilla valley. No other examples were collected by us but several were examined in the bags of native hunters. The species is not at all numerous.

In the region about Tela this bird appears to be confined to the heavy

forests, whence at dawn and dusk its rapidly repeated onamatopoetic "*guangalola*" may be heard to issue.

Specimens of *Tinamus robustus* from Honduras (Lancetilla and Yaruca) are somewhat intermediate between *T. m. robustus* and *T. m. fuscipennis* but much nearer the former. An example from the Rio Tuma in northern Nicaragua is, however, clearly referable to the latter.

The name *Tinamus robustus* is ordinarily assumed to have originated with Sclater in the P. Z. S. for 1860, p. 253, based on an example from Orizaba, but the name is a *nomen nudum* at that citation and was not validated until the publication of Exotic Ornithology in 1868.

Crypturellus soui meserythrus (Scl.)

Tinamus meserythrus Sclater, P. Z. S., 1859, p. 392 (Playa Vicente, Oaxaca, Mexico).

The guide, Ramon Givara, shot a specimen of this small Tinamou as it was running along a trail through bushy second growth near the Tela River just above the Lancetilla experiment station 14 January. The bird proved to be an adult female.

On several occasions I caught sight of what appeared to be individuals of this species on the lower slopes of the forested hills bordering the valley, and once found a feather from the back of one while walking through an abandoned section of bananas. The species is probably not uncommon in the lower mountain slopes and valley bottoms in the region about Tela.

Crypturellus boucardi costaricensis (Dwight and Griscom)

Crypturus boucardi costaricensis Dwight and Griscom, Am. mus. novit., no. 142, 1924, p. 1 (Miravalles, 1,500 feet, Costa Rica).

Perdiz

A female was shot by Bangs as it crossed the trail at an elevation of about 1,200 feet in open forest to the south of Lancetilla, 22 March. In addition to this example I examined the mangled remains of another in a bag with three Guangalolas, made by two native hunters on 18 March in the extreme upper Lancetilla valley.

No Tinamou of this species has been taken previously in Honduras, though its occurrence was postulated by the fact that *Crypturellus boucardi* ranges from southern Mexico to northern Costa Rica.

I am quite convinced that Dwight and Griscom are right in describ-

ing a southern race of this species, but I am not so certain that the characters they point out are the ones by which it really differs. The Lancetilla specimen agrees more nearly with two birds from northern Costa Rica than with examples from Mexico and Guatemala, so I have referred it to *costaricensis*, though possibly the fact that it is in very fresh and unworn plumage may accentuate the resemblance.

CRACIDAE

Crax globicera globicera Linn.

Crax globicera Linné, Syst. nat., ed. 12, **1**, 1766, p. 270 (Habitat Brasilia, Curacao. Error, I designate Vera Cruz, Mexico).

Pajuil, Pajuia, Curassow

A fine adult male of this large bird was shot 10 February from the tops of tall trees growing at an elevation of about 1,000 feet in the hills east of Lancetilla.

The Pajuil is much prized as a table-bird (for a bird that is always shot perched cannot exactly be regarded as a game bird) by both the Honduranians and foreigners, and is hunted assiduously whenever occasion permits. It is a rather uncommon species.

Penelope purpurascens Wagl.

Penelope purpurascens Wagler, Isis, 1830, p. 1110 (Mexico).

Pavo, Turkey

A male and a female were taken 24 January from a band of half a dozen or so individuals feeding in the tree tops well up near the summit of the ridge forming the eastern border of the Lancetilla valley.

Like the Curassow, the Pavo is an object of considerable attention on the part of native hunters; the species has become uncommon in the vicinity of Tela.

Ortalis vetula plumbiceps (Gray)

Ortalida plumbiceps Gray, List Gallinae Brit. mus., 1867, p. 11 (Honduras, [= Omoa], Guatemala).

Chachalaca

On 1 February I shot a female Chachalaca near Progreso; 30 March a male was secured from a native hunter that had been taken near Lancetilla. These birds agree with examples from eastern British

Honduras and Guatemala. Chachalacas have not been recorded previously from east of Omoa though they are very common in the Ulua valley.

They are birds of the scrub second growth in the lowlands, where their loud cry is frequently heard, but where a glimpse of the bird is rare. Walking quietly along the edge of a clearing bordering a dense tangle of second growth one may sometimes see a Chachalaca perched part way up a small tree, or in traversing a path through some tangle, a fleeting glimpse of one is obtained as it flashes rapidly across a narrow opening. Chachalacas are usually heard in the early morning as they call in chorus, but at any hour of the day one may start calling, and the cry is taken up on all sides for a few minutes, only to stop as suddenly as it began.

PERDICIDAE

Odontophorus melanotis verecundus subsp. nov.

Perdiz

Type.— Adult female, No. 136509 M. C. Z.; Lancetilla (1,100 feet), Honduras; collected 10 February 1928 by James L. Peters (orig. no. 5325).

Characters.— Similar to *Odontophorus melanotis melanotis* Salvin, of eastern Nicaragua and eastern Costa Rica but slightly grayer above, especially the upper back; black markings on the scapulars and interscapulars less pronounced; less black freckling on the wing coverts; below, the dark bars on the tibiae obsolete, the light interspaces wider and paler.

On 10 February while ascending the trail from Lancetilla to the eastern rim of the valley Bangs and I came suddenly upon a little bevy of these Quail close beside the path. The birds immediately took shelter in the heavy underbrush bordering the trail at that point, but I succeeded in securing two specimens, both females, before the flock escaped altogether. This is a rare bird in the Tela region, the instance of its occurrence just noted being the only one that came to my notice.

There are no previous records for *Odontophorus melanotis* in Honduras, the species being known previously only from eastern Nicaragua and northern and eastern Costa Rica south to western Panama; in the latter region it is represented by a very distinct race *O. m. coloratus* Griscom. The races of *O. melanotis* become more deeply colored, run-

ning from north to south. The form described here is the most lightly colored of all and probably occupies a small range in the Caribbean rain forest region of Honduras. *O. m. melanotis* ranges at least from the Segovia River (Wanks River) through northern and eastern Costa Rica, while *coloratus* inhabits western Panama and possibly also the Talamanca region of Costa Rica. It is essentially a bird of the rain forest.

Rhynchortyx cinctus pudibundus subsp. nov.

Gallito del Monte; Corniza

Type.— Adult female, No. 136511 M. C. Z.; Lancetilla (1,000 feet), Honduras; collected 17 January 1928 by James L. Peters and Edward Bangs (orig. no. 5117).

Characters.— Similar to *R. c. cinctus* (Salvin) but general tone of coloration of the upper parts slightly grayer, abdomen more extensively white and posterior portion of flanks less washed with buffy.

The male of this form does not exhibit the characters on which it is based to so marked an extent as does the female; the latter is much less heavily barred on the flanks and posterior underparts, the buffy wash on the underparts is wanting; the pectoral band and sides of the head are more olivaceous, less reddish brown; the aurieular patch is dusky, instead of reddish.

Bangs and I started a pair in relatively open forest at 1,000 feet elevation near Lancetilla 17 January and Bangs sueceeded in shooting the female. Native hunters told me that the Gallito del Monte was not uncommon on the higher ridges east of Lancetilla, and that during the winter the birds went about in small flocks. In an effort to secure additional material I supplied a native hunter with ammunition containing smaller shot than the buckshot cartridges that he was accustomed to use and sent him out. He returned after an all-day hunt with a male and a female, the former badly shot. We obtained no other specimens, but a few mangled examples were occasionally found among the trophies of native hunters.

Rhynchortyx cinctus has not been met with by collectors north of Nicaragua, where it extends at least to the Rio Tuma. Specimens from Nicaragua are practically indistinguishable from birds collected in Darien.

COLUMBIDAE

Columba rufina pallidicrissa Chubb

Columba pallidicrissa Chubb, Ibis, 1910, p. 60 (Costa Rica).

Paloma Morena

The Pale-vented Pigeon was the only species of large pigeon found in the Lancetilla valley and the only one positively identified elsewhere in the vicinity of Tela or in the lower Ulua valley. A male in exceptionally fine plumage was collected at Lancetilla 20 January and a female at Progreso 30 January.

Chamaepelia rufipennis rufipennis (Bp.)

Talpacotia rufipennis Bonaparte, Consp. av., **2**, 1854, p. 79 (Carthagena, Colombia).

Palomita

The Ruddy Ground Dove is a species ranging from southeastern Mexico to Colombia, Venezuela and the Guianas. I found the bird a common resident in the region about Tela and up the Ulua valley. It is essentially a bird of the more open or brushy situations, being entirely absent from the forests. Two examples only were secured, a female at Lancetilla 8 February and a male near Urraco (52 km. west of Tela) 12 March.

Claravis pretiosa pretiosa (Ferrari-Perez)

Peristera pretiosa Ferrari-Perez, Proc. U. S. nat. mus., **9**, 1886, p. 175 (Jalapa, Vera Cruz).

Palomita

Five specimens were secured at Lancetilla between 20 January and 9 February; three of these were males, two were females.

The Blue Ground Dove is a fairly common resident in the region about Tela; it is absent from the forest and is seldom found in the second growth. It is seen with the greatest frequency in or about the native clearings, the pastures or abandoned banana lands.

Leptotila plumbeiceps plumbeiceps (Sel. and Salv.)

Leptoptila plumbeiceps Sclater and Salvin, P. Z. S., 1868, p. 59 (Vera Paz, Guatemala).

An adult female of this rare Quail Dove was taken in an overgrown pasture beside the Yoro road, close to Tela, on 13 March.

The genus Leptotila contains about twenty species, occurring from the Rio Grande valley in Texas south to Argentina; three or more species sometimes occur together in a given region. As they all bear superficial resemblance to one another in size and dull coloration and are always found in moist shady spots, identification is uncertain unless the bird is collected. *Plumbeiceps* is distinguished from the other Quail Doves inhabiting Honduras by its clear bluish gray crown.

Leptotila cassini cervineiventris (Scl. and Salv.)

Leptoptila cervineiventris Sclater and Salvin, P. Z. S., 1868, p. 59 (Vera Paz, Guatemala).

Paloma turca

February 5 Mr. J. E. Falconer presented me with a female of this species that he had just shot in the forested hills east of Lancetilla, but no other examples were seen until 7 March, when Bangs killed another female at the edge of a pasture near Tela. After the middle of March when many of the species of forest trees had shed their leaves, resulting in the admission of more light to the forest floor, as well as forming a carpet of dry leaves that crackled at the slightest touch, we found this dove more common than we had believed. Specimens were secured 22, 25 and 29 March; the one taken on the last date was a female about to lay.

Oreopelia montana (Linn.)

Columba montana Linné, Syst. nat., ed. 10, **1**, 1758, p. 163 (Jamaica).

An adult female was taken in dense forest near Lancetilla 29 March. While this specimen constitutes the first record for Honduras, there is nothing noteworthy in the fact, since the Ruddy Quail Dove enjoys a wide range which includes the Greater Antilles and the whole of continental tropical America from Vera Cruz to Paraguay.

RALLIDAE

Creciscus ruber ruber (Scl. and Salv.)

Corethrura rubra Sclater and Salvin, P. Z. S., 1860, p. 300 (Coban, Vera Paz, Guatemala).

Five specimens of this Rail were secured near Lancetilla, a male 20 January, a male 10 February, a male and two females 14 March. We

found these little birds not uncommon about Lancetilla where they frequented the grassy borders of little streams, at times straying out into the *potreros* during the early morning. As is usually the case with small rails, they are secretive, not flying until almost underfoot, and then giving a squeak as they rise to flutter off a short distance, to alight once more and run off through the grass or weeds.

CHARADRIIDAE

Oxyechus vociferus vociferus (Linn.)

Charadrius vociferus Linné, Syst. nat., ed. 10, **1**, 1758, p. 150 (Virginia and Carolina).

The Killdeer is a species nesting in North America and wintering from the southern United States south to northern South America. Bangs and I found the birds common at the time of our arrival at Tela. They occurred in numbers on the golf links, about the edges of small sloughs and swamps, and four frequented a ploughed field close by the office building at Lancetilla. The bulk of the birds had left for the north by the middle of March, and after that time the only representatives noted were occasional stragglers.

SCOLOPACIDAE

Tringa solitaria solitaria Wils.

Tringa solitaria Wilson, Am. orn., **7**, 1813, p. 53, pl. 58, fig. 3 (probably the Pocono Mts., Pennsylvania).

On three successive days beginning 9 March there was a small flock of Solitary Sandpipers along the banks of the Toloa canal; a male was collected 10 March.

Actitis macularia (Linn.)

Tringa macularia Linné, Syst. nat., ed. 12, **1**, 1766, p. 249 (Pennsylvania).

Spotted Sandpipers were seen on several occasions on the beach at Tela and in numbers along the Palomas — Toloa canal; none were collected.

PARRIDAE

Jacana spinosa spinosa (Linn.)

Fulica spinosa Linné, Syst. nat., ed. 10, **1**, 1758, p. 152 ("Panama" fixed as the type locality by Todd, Ann. Carn. mus., **10**, 1916, p. 219).

Bangs shot an immature male Jacana 28 February on the Toloa lagoon. In the region about Tela this strange bird is not uncommon in the marshes and about stagnant pools, where the surface of the water is covered with a floating mat of aquatic plants. We found them in one or two favorable situations at the very outskirts of Tela in the Toloa swamp where the railroad crosses it, about 34 kilometers west of Tela and on the Toloa lagoon. When undisturbed the birds come out into the open, walking about on the lily pads and floating vegetation, the enormous development of their toes permitting them to do this; small leads of open water are crossed with a fluttering flight. When alarmed the Jacana scuttles into the nearest cover, or takes refuge in flight.

ARAMIDAE

Aramus pictus dolosus Peters

Aramus pictus dolosus Peters, Occ. papers Boston soc. nat. hist., **5**, 1925, p. 144 (Bolson, Costa Rica).

February 27 Bangs and I shot three Limpkins in the swamp along the railroad in the Martinez Creek region, 34 kilometers west of Tela; all three birds were males. Several other individuals were seen in that locality the same day. As a rule Limpkins are shy birds, preferring to spend the day in the seclusion of dense swampy woods and thickets, whence they emerge at night fall; the day on which we found them at Martinez Creek was a dark, lowering day, and no doubt they are much more active during daylight hours under such conditions.

These specimens all have the white base of the secondaries extended well along the shafts; the character upon which I based the Central American race. I have recently examined the specimen said to be from Brownsville, Texas, in the collection of the American Museum of Natural History, recorded by Miller and Griscom (Am. mus. novit., no. 25, 1921, p. 13) as *Aramus vociferus holostictus* (Cabanis) and find as was to be expected, that it is an example of *dolosus*.

THRESKIORNITHIDAE

Ajaia ajaja (Linn.)

Platalea ajaja Linné, Syst. nat., ed. 10, **1**, 1758, p. 140 (America australi = Jamaica from first citation).

Roseate Spoonbills are rather uncommon in the region about Tela; they are usually seen in the swamps about Toloa Creek and the Ulua River. Bangs and I saw two in flight near Martinez Creek on 27 February, and on 10 and 11 March saw two more flying a little distance apart from a flock of Wood Ibises over the Toloa swamp. On none of these occasions did the birds pass within gunshot.

CICONIIDAE

Mycteria americana Linn.

Mycteria americana Linné, Syst. nat., ed. 10, **1**, 1758, p. 140 (America calidiori = Brazil, from first citation).

On 11 March Bangs killed a male Wood Ibis, not quite adult, from a small flock that we had just started from the mud flats in the drained portion of the Toloa swamp back of La Fragua farm. This species was not uncommon in the region drained by the Palomas-Toloa canal, where it frequented the partly dried-up pools and the borders of the drainage ditches in company with myriads of ducks and herons.

ARDEIDAE

Casmerodius albus egretta (Gmel.)

Ardea egretta Gmelin, Syst. nat., **1**, pt. 2, 1789, p. 629 (Cayenne).

Garza blanca, Egret

Egrets were common in the swamps near Martinez Creek, in the Toloa swamp and along the banks of the Palomas-Toloa canal. None were collected.

Florida caerulea (Linn.)

Ardea caerulea Linné, Syst. nat., ed. 10, **1**, 1758, p. 143 (America septentrionali = Carolina).

The Little Blue Heron is by far the most widely distributed of all the herons noted in the region about Tela. It is, of course, most common in the swampy regions, Martinez Creek, Toloa swamp, etc., but is also found either singly or in small numbers at the borders of muddy pools

and along small streams anywhere in the coastal district. On one occasion I flushed one from the banks of the Tela River, where it emerges from the forest above the experimental station at Lancetilla. A specimen was shot by Mr. Frederick V. Coville late in January near the experiment station; I examined this bird in the flesh, but did not skin it.

Leucophoyx thula thula (Mal.)

Ardea thula Molina, Sagg. stor. nat. Chile, 1782, p. 235 (Chile).

On 10 and 11 March I saw a compact flock of at least fifty individuals along the Toloa canal. None were shot, but the flock passed by in flight at very close range, and all the field marks were plainly distinguished.

This species is placed by modern writers in the genus Egretta Forster (type by monotypy *Ardea garzetta* Linn.) but the characters for Leucophoyx Sharpe (type by monotypy *Ardea candidissima* Gmel.) are just as valid as the characters upon which many other heron genera are founded. I believe that the numerous and decomposed occipital plumes and the much elongated and decomposed neck plumes entitle this species to be placed in a monotypic genus.

Hydranassa tricolor ruficollis (Gosse)

Egretta ruficollis Gosse, Birds of Jamaica, 1847, p. 338 (Burnt Savanna River, Jamaica).

A few Louisiana Herons were seen in the swamps near Martinez Creek and in the Toloa swamp. The birds were all solitary examples, not associated with other species and were seen under satisfactory conditions at very close range; none were collected.

Nycticorax nycticorax naevius (Bodd.)

Ardea naevia Boddaert, Table, pl. enlum., 1783, p. 56 (Cayenne).

On 28 February two or three Black-crowned Night Herons were flushed from the bushes bordering a short canal leading from Camp Tomasa to the Toloa lagoon.

Butorides virescens maculatus (Bodd.)

Cancroma maculata Boddaert, Table, pl. enlum., 1783, p. 54 (Martinique).

I shot an immature female Green Heron 11 March on the banks of the Palomas-Toloa canal. This specimen is just commencing to molt

into the plumage of the adult as evidenced by a sprinkling of fresh maroon feathers on the sides of the neck, a few ornamental dorsal plumes partly grown out; and the second, third and fourth rectrices (counting from the middle pair) on the left side of the tail are fresh, while the balance of the tail is unmolted. There can be no doubt that this example represents the breeding bird of the region, since the ovary was much more active than would be the case with a North American migrant at that season.

The wing measures 167 mm. For purposes of comparison I have measured ten adult females from the West Indies (typical *maculatus*) and obtain a range of from 156 to 173 mm., with an average of 164.6; while ten females from the eastern United States (typical *virescens*) run from 172 to 186, average 178.3. I believe that the breeding Green Herons in Central America, at least on the eastern slope, should all be referred to *maculatus*.

Heterocnus cabanisi (Heine)

Tigrisoma cabanisi Heine, J. f. O., 1859, p. 407 (Mexico).

On 20 February I shot a fine adult female Tiger Bittern in a tiny grassy morass bordering a small stream through scrubby second growth, not far from the Lancetilla farm.

During the course of a ride by motor boat on the Palomas-Toloa canal on 9 March I saw three of these birds, all on the return trip which was made about sunset; none were seen on the way down made by daylight nor on the more leisurely collecting excursions on the two succeeding mornings.

In flight, at least for short distances, these Tiger Bitterns take only a slight "bend" in their necks instead of the characteristic heron-like fold.

ANATIDAE

Cairina moschata (Linn.)

Anas moschata Linné, Syst. nat., ed. 10, **1**, 1758, p. 124 (India, error. Brazil, designated as type locality by Berlepsch and Hartert, Nov. zoöl., **9**, 1902, p. 131).

Muscovy Ducks are probably not uncommon in the region about Tela, especially where there are large areas of marsh in the neighborhood of forest. Bangs and I saw a pair 27 February in the Martinez swamp and a couple of solitary individuals along the Toloa canal 10 March.

Dafila acuta tzitzihoa (Vieill.)

Anas tzitzihoa Vieillot, Nouv. dict. hist. nat., **5**, 1816, p. 163 (Mexico).

Pintails occur among the enormous flocks of ducks that in winter frequent the extensive marsh areas in the lower Ulua valley. I was unable, however, to determine in what proportion this species occurred with the next two succeeding, or what additional species might have been present.

Querquedula discors (Linn.)

Anas discors Linné, Syst. nat., ed. 12, **1**, 1766, p. 205 (North America = Virginia or Carolina).

Very large flocks of ducks, composed almost entirely of this species, were found 10 and 11 March feeding in muddy pools and back waters in the drained portion of the Toloa swamp. Several examples were shot and used as food, though no specimens were preserved.

Spatula clypeata (Linn.)

Anas clypeata Linné, Syst. nat., ed. 10, **1**, 1758, p. 124 (coasts of Europe = southern Sweden from Fn. Suec.).

The Shoveller appears to be a not uncommon winter visitor to the northern coast of Honduras, though just what its percentage of occurrence is among the large flocks of ducks that feed on the marshes and lagoons of the Ulua valley is not known. March 10 and 11 several were seen with large flocks of Blue-winged Teal along the Toloa canal and adjacent ditches, and on the latter date one was shot to complete a satisfactory identification, but the bird was not preserved.

Only two other species of ducks have been previously recorded from Honduras. They are: — *Dendrocygna autumnalis* (Linn.), recorded from Lake Yojoa by Sclater (P. Z. S., 1858, p. 360) and Taylor (Ibis, 1860, p. 315). *Nettion carolinense* (Gmel.), recorded by Moore (P. Z. S., 1859, p. 65) from the Aloor (= Ulua)River. It is obvious that the list of ducks so far found in Honduras is very far from complete.

PHALACROCORACIDAE

Phalacrocorax olivaceus mexicanus (Brandt)

Carbo mexicanus Brandt, Bull. acad. St. Pétersb., **3**, 1837, p. 56 (Mexico).

An immature female Mexican Cormorant was taken on the Toloa lagoon 28 February. The species is rather common throughout the extensive swamp area lying to the westward of Tela.

The specimen secured agrees with Mexican examples in its small size — wing 250; culmen 43 mm.

FREGATIDAE

Fregata magnificens rothschildi Math.

Fregata magnificens rothschildi Mathews, Bds. Austr., **4**, 1915, p. 280 (Aruba).

Frigate birds are often seen off the beach at Tela; none were collected.

PELECANIDAE

Pelecanus occidentalis subsp.

We found Pelicans fairly common along the shore in the vicinity of Tela. There is little doubt that the Pelicans of the West Indies are subspecifically distinct from the birds of the southeastern United States, but the question as to which of the two forms the Pelicans of the east coast of Central America should be referred, is left in abeyance in the absence of specimens.

CATHARTIDAE

Sarcorhamphus papa (Linn.)

Vultur Papa Linné, Syst. nat., ed. 10, **1**, 1758, p. 86 (India occidentali, error. Brazil substituted as type locality by Brabourne and Chubb. 1912).

Zorpe Rey

King Vultures are greatly outnumbered by the next two species, and while the bird cannot be rated as rare, nevertheless the appearance of one is not an everyday occurrence. Bangs and I met with one 14 January perched in the upper branches of a tall dead tree in a clearing in the upper Lancetilla valley; a shot fired at long range failed to secure the specimen. Mr. Paul C. Standley observed one near Tela in company with a large number of black vultures 8 March, engaged in feeding on the carcass of a horse. Dr. Thomas Barbour noticed four circling high in the air over the station at Lancetilla 18 March.

There is a belief current that wherever the King Vulture occurs, he is privileged to eat his fill of carrion undisturbed by the Turkey Buzzards and Black Vultures, and that until his hunger is satiated, the others stand back respectfully.

Coragyps atratus atratus (F. A. A. Meyer)

Vultur atratus F. A. A. Meyer, Zoöl. annal., **1**, 1794, p. 290 (Florida, ex Bartram).

The Black Vulture is an abundant bird in the region about Tela and up the Ulua valley; it is largely found in and about towns and villages.

In the absence of specimens from Central America I have followed common usage in regarding these birds the same as the form inhabiting the southern United States. Apparently the only difference between *C. a. atratus* and *C. a. foetens* (Licht) is one of size and on this basis I have identified an adult female (No. 114273 M. C. Z.) from Saboga Island, Bay of Panama, as belonging to the latter small race. From the limited amount of South American material of this species at hand, I am inclined to suspect that the Black Vulture in the southern part of its South American range attains greater size than the birds inhabiting the tropical portions of that continent.

The specific name of the Black Vulture requires some slight comment. For many years it was believed that *Vultur urubu* Vieillot (Ois. Am., Sept., **1**, 1807, p. 23, pl. 2, Carolina and Florida) was the earliest name, Bartram's *Vultur atratus* being rejected since the latter author was non-binomial. All of Bartram's names, however, were validated by F. A. A. Meyer in a short-lived journal, Zoologische Annalen, published at Weimar, and of which only the first volume ever appeared.

Cathartes aura aura (Linn.)

Vultur Aura Linné, Syst. nat., ed. 10, **1**, 1758, p. 86 ("America calidiore," Vera Cruz, Mexico, substituted as type locality by Nelson, Proc. biol. soc. Wash., **18**, 1905, p. 124).

Although exceeded greatly in numbers by the previous species, nevertheless Turkey Buzzards were more numerous in the region about Tela than is generally the case with this species in Central America. Whereas the Black Vulture is the species usually found about the habitations of man awaiting the offal that is thrown out, the Turkey Buzzard, on the other hand, spends much of its time on the wing, quartering back and forth above stretches of open or semi-open country.

FALCONIDAE

Asturina plagiata micrus Mill. and Grisc.

Asturina plagiata micrus Miller and Griscom, Am. mus. novit., no. 25, 1921, p. 4 (4 miles northeast of Chinandega, Nicaragua).

Five examples of this bird were secured: an immature female at Lancetilla 20 January; an adult female at Lancetilla 28 March; an adult male at Tela 13 March; adult female at Progreso 31 January and an adult male 52 kilometers west of Tela, 9 March.

These five specimens are all referable to the form named by Messrs. Miller and Griscom from western Nicaragua, but I must confess that I do not see how these gentlemen secured such a satisfactory set of nonoverlapping wing measurements. My figures run smaller because the wing is measured across the chord of the primaries. Since the type locality of *A. p. plagiata* is the city of Vera Cruz I measured only specimens from Vera Cruz and southern Tamaulipas, obtaining from six males of *p. plagiata* wings running from 241 to 250 and for two females 266 to 271. A male of *micrus* of northwestern Costa Rica gives 242 and two females from western Nicaragua 258 to 265. My two males from Honduras run from 233 to 241 and the three females from 256 to 263. When viewed in series, *micrus* appears darker below, due to the deeper tone of the gray bars; also, as Miller and Griscom have pointed out, in this race the second tail bar is reduced to a series of spots, while in *p. plagiata* it is usually complete. To sum up then, *micrus* is distinguishable on the basis of a combination of three *average* characters: smaller size, deeper coloration and less conspicuously barred tail. The exact limits of the area occupied by this form have yet to be determined. It occurs in Nicaragua and Costa Rica apparently only on the Pacific slope, in the latter country south only to the Gulf of Nicoya. Specimens of this species taken by G. C. Taylor (Ibis, 1860, p. 225, recorded as *Asturina nitida?*) at Comayagua and Tigre Island, Honduras, are probably referable to *p. micrus*, but a specimen from the Swann collection taken in Salvador is certainly *p. plagiata*, while an example from the Toledo district of British Honduras is exactly intermediate. It is interesting to note that in addition to this species being unrecorded from eastern Costa Rica and eastern Nicaragua it has not been taken east of Tela, Honduras since it was not secured by Brown at Ceiba and Yaruca, nor by Townsend at Truxillo and Segovia River. The absence of this bird from a Central American collection is significant, since it is usually a rather common species, given to selecting a conspicuous perch and permitting an extremely close approach.

Rupornis magnirostris arguta Peters and Griscom

Rupornis magnirostris arguta Peters and Griscom, Proc. New Eng. zoöl. cl., **11**, 1929, p. 46 (Almirante, Panama).

Gavilan

This is the common hawk of the region about Tela. It is essentially a bird of the open — the pastures, abandoned banana lands or clearings that have begun to revert. The bird seeks a rather low perch, one that is little above its surroundings; telephone poles are particularly favored. It is extremely tame and unsuspicious and may be very closely approached.

Urubitinga anthracina anthracina (Licht.)

Falco anthracina Lichtenstein, Preiz-Verz. Mex. Vög., 1830, p. 3 (Mexico).

Gavilan Negro

An immature female was shot 7 March from a small clump of trees beside the railroad track just east of Tela. This bird had a single ovary, but developed on the right instead of the left side. Black Hawks, presumably of this species, were often seen flying high over the hillsides on the western slopes of the Lancetilla valley.

Leucopternis ghiesbreghti costaricensis W. L. Scl.

Leucopternis ghiesbreghti costaricensis Sclater, Bull. B. O. C., **39**, 1919, p. 76 (Carillo, Costa Rica).

Gavilan Blanco

A series of five specimens, four males and a female, was collected at Lancetilla between 21 January and 22 February.

This large White Hawk is not an uncommon bird in the Lancetilla valley. Its usual haunts are the partly cleared hillsides, where the tall dead trees furnish suitable lookout perches, but it is also at home to a certain extent in the mountain forests. It is probable that a bird of the size and build of Leucopternis feeds to a large extent on small mammals and reptiles; nevertheless, the stomach of an example shot in the forest contained the feathers of a small bird. On 23 March, Bangs and I saw one at very close range in mountain forest, feeding upon a small freshly caught snake.

The note is a high-pitched, petulant squeal, very similar to that of *Buteo jamaicensis*.

These five birds from Honduras are quite typical of *costaricensis*. Of two specimens in the Museum of Comparative Zoölogy from the Toledo district, British Honduras, one is just like examples of true *ghiesbreghti* of southern Mexico, the other shows a close approach toward *costaricensis*, in having the secondaries and inner primaries invaded with black.

Herpetotheres cachinnans chapmani Bangs and Pen.

Herpetotheres cachinnans chapmani Bangs and Penard, Bull. M. C. Z., **62**, no. 2, 1918, p. 37 (Quintana Roo, Mexico, type from Santa Lucia, Rio Hondo).

This species was met with only at Progreso, where a male was taken 30 January from the top of a tall tree in a pasture close to the town and not far from the banks of the Ulua River. In my limited field experience with this bird I have found it in cleared river lowlands where scattered tall trees remain. It generally selects a perch among the topmost branches, uttering its characteristic call at frequent intervals.

Rostrhamus sociabilis plumbeus Ridgw.

Rostrhamus sociabilis var. *plumbeus* Ridgway in: — Baird, Brewer and Ridgway, Hist. North American Birds, **3**, 1874 (p. 208 in key), p. 209 (Everglades, Florida).

Everglade Kites were met with only on the Toloa lagoon, 23 February. Here Bangs shot one as it flew across an open pool; another was seen within gunshot, but in a place where recovery would have been impossible. The specimen secured was a male, still immature; the measurements are: — wing 366; tail 212; culmen 30 mm.

The color characters on which this race is separated from *s. sociabilis* are not apparent in immature birds, but such examples may be distinguished by the average larger size of the northern form.

The Everglade Kite is everywhere throughout its range of local occurrence, there are few records for it anywhere in Central America, and the specimen here recorded is the first instance of its occurrence in Honduras.

Falco albigularis albigularis Daud.

Falco albigularis Daudin, Traite, **2**, 1800, p. 131 (Cayenne).

On 6 March a pair of this Falcon was seen on a tall dead tree at the upper end of a steep hillside *potrero* at Lancetilla. Both were shot in the act of copulating, but the male was lost in a dense tangle below the

tree. Examination of the crop and stomach of the female revealed the skin, flesh and portions of the skull of a freshly killed bat in the former, while the latter organ contained many bat bones, hair and partly digested meat. It is quite possible the *F. albigularis* catches at least a part of its principal food from the more accessible roosting species of bats, since the crop contents of the specimen examined were obviously quite fresh, and the bird was not killed until about nine in the morning, nor skinned until some hours later. No other Bat Falcons were noted anywhere else in the region about Tela.

In 1918 Chubb described as new two races of this species, one from Bolivia, the other from Yucatan. I have seen no topotypical material of the former, but comparison of a small series from Yucatan with topotypical *albigularis* leads me to conclude that the Yucatan form is based on characters that are not correlated with locality, a conclusion also reached by Todd in 1922.

Hellmayr (Field mus. publ. zoöl., ser. **12**, no. 18, 1929, p. 455) upholds the validity of Chubb's *Falco albigularis pax* (Bull. B. O. C., **39**, 1918, p. 22), from Bolivia. For the specific name he uses *rufigularis* Daudin (Traite d'orn., **2**, 1800, p. 131) in preference to *albigularis* which has line anteriority on the same page, believing that the latter name is of "doubtful applicability." It seems to me that both names are equally applicable to the Bat Falcon, so I continue to use *albigularis* as its specific name.

Falco sparverius sparverius Linn.

Falco sparverius Linné, Syst. nat., ed. 10, **1**, 1758, p. 90 (Carolina).

Bangs shot a male in a clearing in the upper part of the Lancetilla valley 14 January; another was seen about the grounds of the experiment station on numerous occasions. The bird collected was in a somewhat dilapidated state of plumage, both outer rectrices were missing and the rest worn or broken, the feathers of the dorsal tract were being renewed as were those of the crown. It is of interest to note that the unmolted interscapulars had a subterminal black bar, while the fresh ones were immaculate.

Pandion haliaëtus subsp.

An Osprey was seen off the beach at Tela between 14 and 17 February. It was too far off to observe the head markings and for this reason subspecific identification is not attempted. Griscom (Am. mus. novit.,

no. 235, 1926, p. 13) has shown that *P. h. ridgwayi* Maynard breeds along the coasts of Yucatan and northern British Honduras. *P. h. carolinensis* (Gmel.), the North American breeding form, also occurs in winter over the Caribbean region.

BUBONIDAE

Pulsatrix perspicillata saturata Ridgw.

Pulsatrix perspicillata saturata Ridgway, Bull. U. S. nat. mus., no. 50, pt. 6, 1914, p. 758 (Santo Domingo, Oaxaca, Mexico).

I obtained a freshly killed example of this owl from a native hunter, who shot it near Lancetilla on the evening of 17 January. This is the first record for this species for Honduras, though its occurrence was to be expected, since its range extends from southern Mexico into South America. The race, ranging northward from western Panama, is apparently more numerous in Panama and Costa Rica than from Nicaragua northward.

Ciccaba virgata centralis Griscom

Ciccaba virgata centralis Griscom, Bull. mus. comp. zoöl., **69**, no. 8, 1929, p. 159 (Chivela, Oaxaca, Mexico).

On 9 March, while staying at Mr. George Ascough's camp on the Palomas-Toloa canal, 52 km. west of Tela, I purchased a live specimen of this species from a laborer, who had come upon it in the woods, and knocked it down with the flat of his machete. The bird was an adult female. *C. virgata* occurs in two phases of plumage, a light phase in which the ground color of the underparts is largely white or buffy and a darker phase in which the entire underparts, face, and sides of the head have a strong rufescent wash. The light phase appears to predominate in the northern half of the bird's Central American range; the rufescent birds are more numerous from Nicaragua southward.

PSITTACIDAE

Ara macao (Linn.)

Psittacus macao Linné, Syst. nat., ed. 10, 1758, p. 96 (South America. Pernambuco, Brazil, adopted as type locality by Hellmayr, Abh. K. Bayer. akad. wiss., 1906, p. 577).

A male was secured 52 km. west of Tela 10 March. The big Red and Yellow Macaw is widely spread, but nowhere common in the region

about Tela and in the lower Ulua valley. At Lancetilla macaws were seen almost daily, usually in the late afternoon or early evening; a pair appearing from across the hills to the eastward and flying with measured wing beat shoulder to shoulder several gunshots high across the valley and passing out of sight beyond the western rim.

Macaws are among the most picturesque of all tropical birds, and always lend a touch to the landscape, particularly when flying towards the sun; at such a time the brilliant scarlet of the underparts stands out strikingly, but at all times their form with the long tail streaming out behind like a plume, their measured wing beat, their habit of flying side by side, scarcely ever changing their relative position, all command more than a passing glance as the birds pass overhead.

The note is very parrot-like, but lower pitched, more deliberate and of much greater volume.

Aratinga astec astec (Souancé)

Conurus astec Souancé, Rev. et mag. zoöl., (2) **9**, 1857, p. 97 (Mexico).

Perriko

Small flocks of paroquets were seen occasionally near Lancetilla, but the only positive identification was made 20 February when one member of a flock of four or five birds was secured from the top of a tall tree in the upper part of the valley.

Amazona auropalliata (Less.)

Psittacus (*Amazona*) *auro-palliatus* Lesson, Rev. zoöl., **5**, 1842, p. 135 (Realejo, "Central America," i.e. Nicaragua).

Bangs shot a female yellow-naped parrot on the Palomas-Toloa canal 10 March.

Amazona autumnalis autumnalis (Linn.)

Psittacus autumnalis Linné, Syst. nat., ed. 10, **1**, 1758, p. 102 (America).

I shot a pair of this parrot 21 February at a point on the railroad about five km. west of Tela. Here several pairs frequented a citrus grove, doing considerable damage to the ripening oranges and grapefruit.

Amazona albifrons nana Mill.

Amazona albifrons nana Miller, Bull. Am. mus. N. H., **21**, 1905, p. 349 (Calotmul, Yucatan).

This species was identified positively only on the Palomas-Toloa canal, where on 11 March I took a mated pair from a flock of four or five pairs feeding upon the fruit of a species of shrub growing abundantly on the banks of the canal.

Eucinetus haematotis haematotis (Scl. and Salv.)

Pionus haematotis Sclater and Salvin, P. Z. S., 1860, p. 300 (Vera Paz, Guatemala).

Mr. F. V. Coville on 29 March shot a female Red-eared Parrot at an elevation of about 1,000 feet in the hills west of Lancetilla. The bird would have laid shortly.

Many of the small parrots seen flying high over the Lancetilla valley, or heard in the surrounding forested hills, may quite possibly have belonged to this species.

ALCEDINIDAE

Megaceryle torquata torquata (Linn.)

Alcedo torquata Linné, Syst. nat., ed. 12, **1**, 1766, p. 180 (Martinica, Mexico = Mexico, ex Brissonian reference).

Mr. Coville shot a female Rio Grande Kingfisher along the Tela River at Lancetilla on 5 February; I secured a male on the Palomas-Toloa canal 9 March. This species is not uncommon in the Tela region, especially beside the larger and more sluggish water courses and open bodies of water. It is less numerous along the clear, swift-running streams.

Recent authors (Chapman 1926, Wetmore 1926, Kennard and Peters 1928) have refused to agree with Bangs and Penard in their contention (Bull. M. C. Z., **62**, no. 2, 1918, p. 53) that specimens of *M. torquata* from South America and Panama represent a recognizable subspecies. With considerably more material than was available to the latter gentlemen I have gone into the matter anew and conclude that for the present it is advisable to recognize only one South American race, *Megaceryle torquata stellata* (Meyen) of southern Argentina and

Chile, referring to *torquata* all the birds from the Rio Grande, Texas, south to the range of *stellata*. A large series from the Isthmus of Tehuantepec northward might show that Mexican birds average slightly larger with more nearly immaculate undertail coverts, in which event *torquata* would be the name for the Mexican birds and *cyanea* the name for the bird of Central America south until it meets *stellata*. *M. t. stictipennis* (Lawr.) of the Lesser Antilles is quite a distinct form and need not be considered here.

Megaceryle alcyon alcyon Linn.

Alcedo alcyon Linné, Syst. nat., ed. 10, **1**, 1758, p. 115 (America).

We found the Belted Kingfisher common and widely distributed throughout the Tela region.

Chloroceryle amazona (Lath.)

Alcedo amazona Latham, Ind. orn., **1**, 1790, p. 257 (Cayenne).

Bangs shot a female Amazon Kingfisher on 26 January beside the Tela River at Lancetilla. This species is the most numerous of the family in the region about Tela and may be found along any of the open water courses. During a heavy rain that fell on 18 and 19 February when the whole valley was more or less under water, I saw two of these birds perched on telephone wires beside the branch railroad line running to Lancetilla, watching for food in the miniature lakes formed by the overflowed drainage ditches, places ordinarily overgrown with grass and haunted by Sporophila.

Chloroceryle americana isthmica (Goldm.)

Ceryle americana isthmica Goldman, Smiths. misc. coll., **56**, no. 27, 1911, p. 1 (Rio Indio, near Gatun, Canal Zone).

A female of this species was collected at Lancetilla by Bangs on 12 February. Other examples were seen occasionally along the Tela River and smaller streams leading into it.

Isthmica is best distinguished from *septentrionalis* by its average smaller size; the males have the rufous breast band wider, encroaching on the white of the lower foreneck; the female has the anterior underparts slightly more buffy than the corresponding sex of *septentrionalis*

Chloroceryle aenea stictoptera (Ridgw.)

Ceryle superciliosa stictoptera Ridgway, Proc. biol. soc. Wash., **2**, 1884, p. 95 (Sisal, Yucatan).

I collected a female of this bird 10 March on the Palomas-Toloa canal. Schott's Kingfisher is rare in the Tela region; Bangs and I did not meet with it at all in the Lancetilla valley, and saw but two or three along a six-mile stretch of the Toloa canal.

MOMOTIDAE

Electron platyrhynchum minor (Hart.)

Prionirhynchus platyrhynchus minor Hartert, Nov., zoöl., **5**, 1898, p. 448 (Panama)

On 17 January I shot a male of this species at an altitude of about 800 feet, in the forest covering the hills eastward from Lancetilla. No others were noted. The bird is either rare or accidental in Honduras, since it has not been previously recorded north of southeastern Nicaragua.

The single specimen shows some slight differences when compared with a series from Costa Rica and Panama, but additional material is required to confirm these differences; especially when considering a member of a family whose members show so much individual variation.

Electron carinatum carinatum (DuBus)

Prionites carinatus DuBus, Bull. acad. roy. Belg., **14**, pt. 2, 1847, p. 108 (Guatemala).

A not uncommon species in the forested hills about Lancetilla, where a male was taken 20 March and a mated pair 25 March, the latter birds at an elevation of about 1,200 feet. It is a bird not easily seen and may be readily overlooked until one becomes familiar with its note, a sound similar to that obtained by blowing across the mouth of an empty bottle. Even then the bird is not always seen, for it chooses a perch high in some forest tree where it sits motionless, concealed from below by the dense foliage. At other times, however, the perch selected is within a few yards of the ground, and then a cautious approach may disclose the bird. Each time the note is uttered the tail is depressed slowly — not jerked sideways.

Eumomota superciliosa bipartitus Ridgw.

Eumomota superciliaris bipartitus Ridgway, Proc. biol. soc. Wash., **25**, 1912, p. 90 (Cacoprieto, Oaxaca).

Three specimens were collected at Lancetilla as follows: a male 9 February, a male 6 March and a female 27 March. I encountered this species only in the Lancetilla valley where it was rather uncommon. It appears to occur only at low altitudes and always in the vicinity of streams.

This bird is entitled to high rank among the beautiful birds of the world. It is seen to best advantage sitting motionless close by a pool of water from which the morning sun is reflected into the shadows above. At such times its soft blended colors relieved by the conspicuous torquoise marks on the head and breast, and its graceful form, certainly raise it to a position attained by few birds anywhere.

Momotus momota lessonii Less.

Momotus lessonii Lesson, Rev. zoöl., 1842, p. 174 (Realejo, Nicaragua).

Three males of Lesson's Motmot were collected at Lancetilla 15 January; 5 and 6 February; the species is nowhere common in the Tela region.

I believe that there are but two species in the genus Momotus, the chestnut-crowned one, for which the oldest name is *mexicanus* of Swainson, and the so-called "blue-crowned," for which Linné's *momota* is the earliest name. Chapman in his account of the distribution of the Motmots (Bull. Am. mus. nat. hist., **48**, art. 2, 1923, pp. 27–59) recognizes two species of the former group and no less than six of the latter. It seems to me, however, that the blue-crowned group, extending from eastern Mexico south to Brazil and Paraguay, is but a single species divisible into twenty geographic forms, all strictly representative, with no two occurring in any one locality, and separable in degree of difference only.

Hylomanes momotula Licht.

Hylomanes momotula Lichtenstein, Abh. ak. wiss. Berol for 1838, 1839, p. 449, pl. 4 (Valle Real, Mexico).

I collected a female Tody Motmot 10 February in humid forest, at an elevation of approximately 1,500 feet, on the hills east of Lancetilla, and a male at the same place 22 February; no others were seen.

H. m. obscurus Nelson certainly does not cover the range assigned to it by Ridgway, and unless it is a very local race confined to the type locality, which I doubt, it cannot be maintained; the differences are not constant, nor even average, but appear to be purely individual, light and dark birds occurring together throughout the range of the species from southern Mexico to Darien.

Little is known about the exact distribution and life history of this bird, it being seldom met with by collectors. Its range appears to be discontinuous, since there is a hiatus in its distribution from northwestern Costa Rica to the Canal Zone. It is probably more numerous in Guatemala whence the Museum of Comparative Zoölogy possesses a good series of "trade skins."

CAPRIMULGIDAE

Nyctidromus albicollis albicollis (Gmel.)

Caprimulgus albicollis Gmelin, Syst. nat., **1**, pt. 2, 1789, p. 1030 (Cayenne).

Ten specimens were secured, all close to Tela; a male 4 February; two males and four females 6 February; three males 4 March. The first specimen listed was surprised during the day roosting on the ground in the midst of a clump of beach grape close to the shore. The others were all killed on the golf links by the simple expedient of jacking them with a pocket flashlight on moonlight nights.

The *cuejo* is a very common resident, showing a marked preference for dry scrubby situations. After sundown the birds come out into the open and at such times are to be found in large numbers along the railroad; they are especially active during the period of the full moon. In spite of their abundance they are scarcely ever seen during the day time.

APODIDAE

Streptoprocne zonaris albicincta (Cab.)

Hemiprocne albicincta Cabanis, J. f. O., 1862, p. 165 (Guiana).

Bangs shot a White-collared Swift (sex not determined) 26 January from a small flock circling low over the Tela River near Lancetilla. The species was observed on two occasions in late January, when a flock was seen high over the upper end of the Lancetilla valley. On 16 March a flock appeared about the experiment station for about an hour in the

morning, and on the 21st the flock was again present several times during the morning.

The single bird collected constitutes the first record of the species for Honduras. It is clearly referable to the form known to occur from northern South America north to Costa Rica and marks a considerable northward extension of range. Huber (Auk, **40**, 1923, p. 302) described *S. z. bouchellii* from Eden, northeastern Nicaragua, giving as the only character the narrower, more mottled in front, white collar. This character is not of subspecific value, however, but depends on age or individual variation, the birds with narrow mottled collars occurring together with wide white-collared examples in a series of *mexicana* and are likewise frequent in a good series of *albicincta* from Costa Rica.

Chaetura richmondi Ridgw.

Chaetura richmondi Ridgway, Proc. biol. soc. Wash., **23**, 1910, p. 53 (Guayabo, eastern Costa Rica).

Seven specimens, all from Lancetilla, a female 16 January, a male and a female 18 January, a male, two females, and one not sexed 22 January.

Throughout the entire period that Bangs and I spent at Lancetilla, a large flock of these swifts appeared from the upper end of the valley at least once every day, hawking over the cleared portions of the lower and middle reaches. The flock usually arrived shortly before sunset and remained for twenty minutes or so before retiring again: sometimes the flock came down at noon, at other times about two or three o'clock, but the afternoon visits were of short duration and in addition to the evening flight. As the month of March advanced, the numbers of this swift and the frequency of its visits to Lancetilla diminished.

Richmond's Swift was also seen 9–11 March near the Palomas-Toloa canal.

TROCHILIDAE

Phœthornis superciliosa longirostris (Delattr.)

Ornismya longirostris Delattre, Echo du monde savant, no. 45, 1843, col. 1070 (Guatemala).

Eight examples of this large dull-colored humming bird were secured, three males and four females, at Lancetilla between 20 January and 3 March; a male at Progreso 31 January. This is a common species in

the Tela region. During January and February the birds were widely distributed both on the hills and in the lowlands and occurred in forest, second growth and abandoned banana lands. After the first of March they were found chiefly in dense second growth on heavy underbrush near water where the males called (or "sang") persistently. This note was given from a perch never over three feet from the ground in a shady thicket, the bird sitting motionless, but each utterance accompanied by a jerk of the tail.

In feeding, the Guatemalan Hermit shows a predilection for large red blossoms; it is certainly insectivorous to some extent, since specimens sometimes were found to have diptera or hymenoptera in the oesophagus when shot.

The series from northern Honduras is somewhat intermediate between *longirostris* and *cephala* (a poorly marked form), but as a whole it is best referred to the former race, though two or three specimens show a very close approach to the latter.

Phœthornis adolphi saturatus Ridgw.

Phoethornis adolphi saturatus Ridgway, Proc. biol. soc. Wash., **23**, 1910, p. 54 (El Hogar, Costa Rica).

Two males, Tela, 7 and 13 March. Not uncommon resident. This species was found to frequent moist shady spots, feeding on small flowers close to the ground. It is an extremely hard bird to collect, usually appearing suddenly to hover at arm's length from the observer, and then disappearing like a flash. From early March onward it resorted to dense thickets, usually in damp locations, there to deliver its "song" from a perch not over a foot or eighteen inches from the ground. In such situations it is almost impossible to see the bird, for its note seems to come from several directions at once, and it is only by the spasmodic jerking of the tail during the utterance that the bird is located.

P. a. saturatus is distinguished from *P. a. adolphi* Gould by the average deeper color of the underparts, more dusky chin, deeper chestnut edgings of the upper tail coverts, and usually more rufous, less grayish, subterminal area on the central rectrices, this color extending onto the white tips which in *saturatus* are sometimes entirely rusty. I believe, however, that Ridgway is wrong in restricting the range of *a. adolphi* to southeastern Mexico and in referring the birds from Guatemala and British Honduras to *saturatus*, skins in the Museum of Comparative Zoölogy from the two latter countries are just like Mexican speci-

mens. The two examples from Tela, while not quite typical of *saturatus*, are much nearer that form, to which I unhesitatingly refer them.

Agyrtrina candida (Bourc. and Muls.)

Trochilus candidus Bourcier and Mulsant, Ann. soc. phys. et nat., **9**, 1846, p. 326 (Coban, Guatemala).

We first found this species at Progreso, where I collected a male and two females 30 January; Bangs took a female at Lancetilla 26 February and a male 2 March.

Amizilis tzacatl tzacatl De la Llave

Trochilus tzacatl De la Llave, Regist. trim., **2**, 1833, p. 48 (Mexico).

Eight specimens of this common and widely distributed bird were secured: two males and three females at Lancetilla between 18 January and 30 March; two males at Progresso 31 January; one male at Tela 13 March.

Thalurania colombica townsendi Ridgw.

Thalurania townsendi Ridgway, Proc. U. S. nat. mus., **10**, 1888, p. 590 (Segovia River, Honduras).

Six specimens of this rare Humming Bird were taken, all at Lancetilla: four females were secured between 15 and 23 January; no more of that sex were certainly identified after that date. The first male was killed 2 February and the second on 19 March close to the spot where the first one was secured.

I believe that *T. townsendi* should be reduced to the status of a subspecies of *T. colombica*. It certainly is a representative form of that species which occurs in Central America north to Nicaragua as *T. c. venusta* Gould. The differences between *townsendi* and *venusta* are not as great as they appear at first glance, but are rather those of degree.

Anthracothorax prevostii gracilirostris Ridgw.

Anthracothorax prevosti gracilirostris Ridgway, Proc. biol. soc. Wash., **23**, 1910, p. 55 (Bolson, Costa Rica).

The Slender-billed Mango is an uncommon species in the Tela region, the only example seen was a female shot beside the Tela River at Lancetilla 27 March. This single specimen, with a culmen measuring only

25 millimeters, is clearly referable to the small-billed race inhabiting Costa Rica and Nicaragua. From the limited material available, I suspect that *gracilirostris* is the lowland form in both eastern Nicaragua and Honduras, while *p. prevostii* extends on the high slopes south to Nicaragua, whence the Museum of Comparative Zoölogy has a specimen collected by Richardson labeled "Matagalpa, 1894." Mr. Griscom tells me that there is no reason to doubt the fact that this bird came from Nicaragua, but that Matagalpa must refer to the department of that name, of course in that portion lying within the Caribbean drainage area.

Heliothryx barroti (Bourc. and Muls.)

Ornismya barroti Bourcier and Mulsant, Ann. soc. d'agric. Lyon, **6**, 1843, p. 48, pl. 4 (Cartagena, Colombia).

Trochilus barroti Bourcier, Rev. zoöl., **6**, March, 1843, p. 72 (Cartagena).

Two males: Lancetilla 19 and 26 January. This is a rare Humming Bird in the Tela region, the two specimens listed being the only individuals found. The first one was seen two or three times daily feeding from the large bluish flowers of a vine growing over the porch of the house Bangs and I occupied; after the bird was collected no others were seen there. The other specimen was shot as it sat perched on one of the lower branches of a willow, growing in a low moist spot in an abandoned clearing.

To my mind it is an open question whether Bourcier first named this species alone in the Rev. Zoöl., Mar., 1843 or whether he named it jointly with Mulsant in the Ann. soc. agric. Lyon sometime during 1843. I am inclined to favor the former citation, since it occurs in a well-known and generally available serial, and with a more or less exact date of publication.

Heliomastes longirostris pallidiceps (Gould)

Heliomaster pallidiceps Gould, Intr. troch., 1861, p. 139. (Mexico and Guatemala, type from Jalapa, Vera Cruz.)

On 31 January I shot a male of this handsome hummer near Progreso while the bird was hovering momentarily before the flowers of a vine in an abandoned banana plantation.

Archilochus colubris (Linn.)

Trochilus colubris Linné, Syst. nat., ed. 10, **1**, 1758, p. 120 (Carolina to New England).

Three Ruby-throated Humming Birds were collected: a female at Lancetilla 9 February, a male five kilometers west of Tela 21 February,

a female near Tela 28 March. They were found rather numerously 21 February on a small flowing tree extensively planted as a hedge and for live fence posts, known commonly as "madre de cacao."

While this is a common wintering species throughout Central America as far as western Panama, it has not been previously recorded from Honduras.

TROGONIDAE

I see no reason for splitting the genus Trogon into four genera as was done by Ridgway and recent authors who have followed him. My conception of the use of a genus is as a vehicle for expressing similarities. When a group of similar species further divides into smaller groups in which slight, external structural modifications appear, it seems to me that these differences are best expressed by the use of the subgenus if they are regarded of any more than specific value.

Trogon puella

Trogon puella Gould, P. Z. S., 1845, p. 18 (Escuintla "S. Am." = Guatemala or Chiapas).

A male and two females were taken 22 February, 14 and 22 March respectively. This species was met with only at Lancetilla where it inhabited the forested hills, the three examples collected were the only ones seen; they were encountered at elevations of between 800 and 1,200 feet.

There is a considerable range both in color and in marking in a long series from nearly all points in the range of the species, but the differences seem due entirely to the age of the bird, perhaps in the case of old skins to a gradual fading. The wide white tips occasionally found in both sexes on three outer pair of rectrices are associated with traces of immaturity elsewhere on the plumage, particularly with coarser vermiculation on the wing coverts and paler scarlet on posterior underparts.

Trogon melanocephala melanocephala Gould

Trogon melanocephala Gould, Mon. trog., ed. 1, pt. 2, 1835, pl. 12 (state of Tamaulipas, Mexico).

Six examples of the Black-headed Trogon were secured: a male at Lancetilla 9 February, and females at the same locality 24 and 25 February and 2 March, a pair at Tela 7 March. Both this and the succeeding species were not uncommon in the Tela region; of the two

species the present one is the more numerous. Both species are of similar appearance in the field, frequent the same situations, i. e. the scrub and second growth in the valley bottoms, cleared hillsides and pasture trees; their notes are also much the same — at least I never learned to distinguish between them.

Gould apparently intended to describe this species prior to the appearance of his Monograph of the Trogonidae, for in his original description he refers to the P. Z. S., pt. 3, 1835, as the first place of publication of the name. In that part he does describe three Mexican trogons; but *melanocephala* is not among them, neither does it appear in another paper in the P. Z. S. for 1834 in which he described other trogons. The type locality as given by Gould is "Tamaulipas, a district of Mexico between Vera Cruz and the Bay of Honduras." No doubt the state of Tamaulipas is meant, but Europeans' ideas of American geography were even hazier then than now, if such a thing is possible.

Trogon violaceus braccatus (Cab. and Hein.)

Aganus braccatus Cabanis and Heine, Mus. Hein., pt. 4, 1863, p. 184 (Mexico).
Trogon caligatus Gould, Mon. trog., ed. 2, pt. 1, 1858, pl. 7 (nec *Trogon caligatus* Gould, 1838)!!!

This trogon is represented in the collection by three males and a female taken at Lancetilla between 24 January and 4 March and a female from Progreso shot 30 January.

The greatest confusion exists as to the correct name of the Gartered Trogons of Central America and northern South America. This confusion is due primarily to the superb indifference with which all ornithologists have regarded the colored plate and description of Gould's *Trogon caligatus* (Mon. Trog., ed. 1, pt. 3, 1838, pl. 7) and also to the disregard by most authors of the differences between the birds of northern Central America and those of southern Central America as later pointed out by Gould himself,[1] by Lawrence who named [2] the bird from Panama, by Cabanis [3] and by Bangs.[4]

The facts are as follows. In the third part of his first edition of his Monograph of the Trogonidae, Gould described and figured *Trogon caligatus* for the first time. The new species was based on a single

[1] Mon. trog., ed. 2, 1858.
[2] *Trogon concinnus* Lawrence, Ann. lyc. nat. hist. N. Y., **7**, 1862, p. 463.
[3] Mus. Hein., pt. 4, 1863.
[4] Bull. M. C. Z., **39**, no. 6, 1903, p. 144–145.

specimen, a male, without locality, but obtained by Gould in Paris from a collection of South American birds. Neither the plate nor the description agrees with birds from Central America; the top of the head is shown as being iridescent blue, whereas in Central American birds this color is confined chiefly to the occiput; the color of the posterior underparts is of exactly the same shade of orange-yellow that serves to distinguish *concinnus* Lawrence from the race inhabiting the region from southeastern Mexico to Honduras, while the vermiculation on the wing coverts of the bird figured is not so fine as in that race. The bird figured and described as *Trogon caligatus* by Gould in the second edition of his Monograph of the Trogonidae is an entirely different bird from that of the first edition; the figures and text accurately describe the bird occurring in southern Mexico, Guatemala and Honduras that was later described as *braccatus* by Cabanis and Heine. In the last paragraph of the text to this plate is Gould's astonishing explanation, that the plate in the first edition had the head colored blue by mistake, and he amplifies his explanation further by saying "how the error arose I cannot imagine, and had I not still by me the original specimen from which the figure was taken and colored I might not have detected the mistake I had made and which is duly corrected in the accompanying plate."

The question now arises whether it is possible to accept Gould's correction, made twenty years after his self-styled error. There are several reasons why it is unlikely that Gould made any error at all. In the first place, I do not see how such a careful ornithologist could possibly have made the mistake in coloring the plate, and then the same mistake in describing the bird. To me it is entirely certain that in the twenty years that elapsed between the appearance of the first and second editions of the Monograph of the Trogonidae, Gould in some manner managed to transpose the type specimen or made a mistake in believing that the bird he "still had by him" was the one that he figured. In the second place, at the time of the appearance of the first edition, material from northern Central America and southern Mexico was not finding its way into Europe in any appreciable amounts but at that time it was coming in in quantities from northwestern South America. In the third place Gould unmistakably figured a bird now known to occur in the then easily accessible lower Magdalena valley in Colombia, a bird that was not recognized as distinct until Chapman named it *Chrysotrogon caligatus columbianus* (Bull. A. M. N. H., **33**, 1914, p. 607, Opon, Colombia), a name that must now fall as a synonym of *Trogon caligatus* Gould.

The slight modifications upon which the genus Chrysotrogon Ridgway are based are of specific rather than of generic value. The races of the species are, together with the characters of the males: —

Trogon violaceus braccatus (Cab. & Hein.)

Southern Mexico to Honduras

Top of head slaty, iridescent portion of head confined to occiput; posterior underparts clear yellow; a white line separating the iridescent breast from the yellow abdomen.

Trogon violaceus concinnus Lawr.

Costa Rica, Panama, western Colombia, western Ecuador

Like *braccatus* but smaller, and posterior underparts orange yellow.

Trogon violaceus caligatus Gould

Magdalena valley and Santa Marta region in Colombia

Similar to *concinnus* but top of head largely iridescent purplish blue; white pectoral band smaller.

Trogon violaceus violaceus Gmel.

Venezuela; Trinidad, the Guianas and northern Brazil

Similar to *caligatus* but vermiculation of wing coverts and secondaries much finer; white tail bars narrower and tarsi less heavily feathered.

Trogon violaceus ramonianus Dev. & Des M.

Upper Amazonia

Ramonianus lacks the white breast band, and the posterior underparts are a deeper orange yellow, otherwise it is very close to *violaceus*.

Trogon violaceus crissalis (Cab. & Hein.)

Eastern ? Brazil

The available material from eastern Brazil and the lower Amazon valley is too meagre to characterize the bird of that large area, which is certainly not *ramonianus*, indeed there appear to be at least two races involved.

Trogon massena massena Gould

Trogon massena Gould, Mon. trog., ed. 1, pt. 3, 1838, pl. 16 and text (Guatemala).

Five specimens of Prince Massena's Trogon were taken, all at Lancetilla between 24 January and 22 February. One of the birds collected on the former date is a male, the other four are females. This is a bird of the heavily wooded tropical forest covering the hillsides, where it is

not uncommon. On 29 March I shot two males sitting together on the same limb. At first I took them to be a pair, as one was "bowing" to the other in what appeared to be a courtship performance. One of the birds was too badly mangled by the charge to skin, and the other was entirely smeared with a sort of sap or fruit gum, even the toes being stuck together by the substance.

CUCULIDAE

Piaya cayana thermophila Scl.

Piaya thermophila Sclater, P. Z. S., 1859, p. 368 (tierra caliente of Mexico and in Guatemala).

Three males and three females of this wide-ranging bird were secured at Lancetilla between 18 January and 3 March.

The "pajaro leon" was not uncommon in the Tela region. It was always found in bushes or low second growth.

Crotophaga sulcirostris sulcirostris Swains.

Crotophaga sulcirostris Swains., Philos. mag., n. s., **1**, 1827, p. 440 (Mexico).

A female, Lancetilla 26 January. The Groove-billed Ani, if not the commonest, is at least the most conspicuous bird in the Tela region. It is to be found in all the pastures, and in any clearing, however small, in which horses, mules or cattle are pastured.

RAMPHASTIDAE

Ramphastos sulphuratus brevicarinatus Gould

Ramphastos brevicarinatus Gould, Mon. ramphast., ed. 2, 1854, pl. 3 and text (western side of the Isthmus of Panama).

Three males of this species were collected at Lancetilla between 15 January and 10 February; a male and a female were secured at Progreso 1 February. The Short-keeled Toucan is widely distributed throughout the region about Tela, occurring both in the hills and lowlands as well as in second growth, abandoned clearings and natural forest. It is held in esteem as a game bird, not because of any difficulties connected with its pursuit (shot gun ammunition in Honduras is never wasted on uncertainties), but because of the delicacy of its flesh.

Specimens from Ceiba, Lancetilla and Progreso, while somewhat

intermediate in size between *R. s. sulphuratus* and *R. s. brevicarinatus*, agree with the latter race in having a well-developed red margin to the feathers bordering the yellow breast; as a whole the series is best referred to *brevicarinatus*. Intermediates from Guatemala, British Honduras and Honduras are referred by Ridgway to the typical form. Available material from the two former countries is insufficient to enable me to form an independent opinion. Perhaps it will some time be necessary to name the bird inhabiting the region between Mexico and the Segovia River, but this should not be attempted until additional material is obtained, not only from the lowlands, but also from the altitudinal range of the species. Two characters claimed by Ridgway as among the criteria for distinguishing the two races are the lesser extent of the red terminal portion of the bill and the deeper yellow throat and foreneck of *brevicarinatus*, but both of these seem to me to be too variable to serve as good diagnostic characters.

Pteroglossus torquatus torquatus (Gmel.)

Ramphastos torquatus Gmelin, Syst. nat., **1**, pt. 1, 1788, p. 354 ("novae Hispaniae maritimis" = southeastern Mexico).

Bangs and I collected a series of seven of this Aracari, three males and four females, at Lancetilla between 14 January and 20 February. This is also a common species of general distribution; it is somewhat more numerous in the Tela region than *Ramphastos* and is often seen in small flocks, sometimes numbering as high as eight individuals.

Selenidera spectabilis Cassin

Selenidera spectabilis Cass, Proc. ac. nat. sci. Phila., 1857, p. 214 (Cocuyos de Veragua, Panama).

On 24 January I shot three males and two females of this species in the open forest above Lancetilla at an elevation of about 1,200 feet; 20 March Bangs shot another male at the identical spot. No other individuals were met with.

Selenidera is generally considered a rare bird in Central America; its known range was from eastern Nicaragua south to northwestern Colombia. Its occurrence in northern Honduras was therefore quite unexpected. I have carefully compared a series of this bird extending from Honduras to Darien and can find no differences at all.

PICIDAE

Centurus santacruzi pauper Ridgw.

Centurus santacruzi pauper Ridgway, Proc. U. S. nat. mus., **10,** 1888, p. 582 (Truxillo, Honduras).

Eight specimens of this Woodpecker were secured: two males and four females at Lancetilla between 14 January and 2 March, two females at Tela 8 and 13 March respectively.

This is the common Woodpecker in the region about Tela, confined chiefly to the pastures, clearings and second growth.

Sphyrapicus varius varius Linn.

Picus varius Linné, Syst. nat., ed. 12, **1,** 1766, p. 176 (North America = Carolina).

While this species was not actually seen or collected, Bangs and I noted its characteristic healed puncture marks made on the trunk of a tree growing near Tela. Yellow-bellied Sapsuckers have been recorded from Honduras previously from Siguatepeque and Ceiba.

Veniliornis oleaginus sanguinolentus (Scl.)

Chloronerpes sanguinolentus Sclater, P. Z. S., 1859, p. 60, pl. 141 (Omoa, Honduras).

One male, Lancetilla 14 January. One of the first birds collected on my first day afield in Honduras was the specimen listed above. The species was not met with again. At the time I shot it, the bird was working its way up a *Cecropia* tree growing in abandoned cleared lands closely bordering the Tela River at Lancetilla.

Celeus castaneus (Wagl.)

Picus castaneus Wagler, Isis, 1829, p. 515 (no type locality. Vera Cruz, designated by Cory, Field mus. publ. zoöl., ser. **13,** pt. 2, no. 2, 1919, p. 453, note d).

Three examples, all females, were collected at Lancetilla 18 January, 6 and 9 February; no others were observed. The first two of these were shot at elevations of between 1,000 and 1,200 feet on the forested hills on the east side of the valley; the third was taken at a lower elevation in second growth woodland on the western side.

Ridgway has already (Birds of North and Middle America, pt. 6, 1914, p. 142) noted the differences shown in the color of the crests between birds from the northern part of the range of the species and those from the southern part. These differences he believes are to a certain extent seasonal, and after examining a good series from nearly all parts of the range extending from southeastern Mexico to western Panama I have come to the same conclusion. The birds with the palest crests are found usually from April to July, while the darker-crested individuals predominate from October to February. Furthermore, birds with light-colored crests seem to have the feathers longer and I believe probably represent the old adults. The whole question, however, must remain open until an even longer series of comparable dates is acquired from the entire range, including birds in first immature plumage.

Scapaneus guatemalensis guatemalensis (Hartl.)

Picus guatemalensis Hartlaub., Rev. zoöl., 1844, p. 214 (Guatemala).

Three males were taken at Lancetilla 19 January, 5 and 6 February. This species is not uncommon in the forested hills, sometimes also being found on dead trees left standing in clearings.

Ceophloeus lineatus similis (Less.)

Picus similis Lesson, Compl. Oeuvr. Buffon, **20**, 1847, p. 204 (San Carlos, république du Centre-Amerique = Salvador).

One male, Lancetilla 5 February. The White-billed Pileated Woodpecker frequents the same situations as the foregoing species but appears to be less numerous.

Picumnus olivaceus dimotus Bangs

Picumnus dimotus Bangs, Bull. M. C. Z., **39**, no. 6, 1903, p. 146 (Ceiba, Honduras).

A male Honduras Piculet was taken at Lancetilla 27 March and a breeding female at Tela the following day. The bird is rather uncommon in the region about Tela. I obtained a momentary glimpse of one near Lancetilla 8 February, close by the spot where the male was subsequently taken. Shortly after collecting the female, the insect-like trill and faint tappings of a second bird were heard, and one or two glimpses obtained as the bird was seen searching among the terminal

twigs of a branch near the ground. All the birds either seen or taken were in low ground, grown up to a tangle of vines and bushes, and near water.

FORMICARIIDAE

Taraba transandeana transandeana (Scl.)

Thamnophilus transandeanus Sclater, P. Z. S., 1855, p. 18 (Guayaquil, Ecuador).

On 27 March I shot a male among the bushes bordering the Tela River near Lancetilla; no other examples were taken. This species appears to be less common in the northern part of its range than in the southern portion.

In my opinion *T. transandeana* is a distinct species, and not a race of *major* as claimed by Hellmayr.

Thamnophilus doliatus intermedius Ridgw.

Thamnophilus intermedius Ridgway, Proc. U. S. nat. mus., **10**, 1888, p. 581 (Truxillo, Honduras).

Three examples of this Ant-shrike were taken: a male at Lancetilla 26 February, a male at Tela 7 March and a female at Tela 13 March; the latter contained a fully formed egg in the oviduct that would have been laid shortly.

This bird is not uncommon in the dense lowland tangles of vines and bushes, where it is more often seen than heard.

Due to some unaccountable lapse both Ridgway and Hellmayr refer to this race by the name of *mexicanus* (*Thamnophilus doliatus mexicanus* Allen, Bull. A. M. N. H., **2**, no. 3, 1889, p. 151, new name for *Thamnophilus affinis* Cab. and Hein. "Xalapa" = Jalapa, Vera Cruz, preoccupied). The distinctness of the Mexican bird was first noted by Cabanis and Heine, but unfortunately they gave it a name already in use in the genus, so Dr. Allen renamed it. However, a year previously Ridgway had noted that the bird extending from southeastern Mexico to eastern Costa Rica differed from the race inhabiting Panama and, apparently ignorant of Cabanis and Heine's previous action, described it as a distinct species. Redescribing the bird, however, as Ridgway did, is the equivalent of renaming as Dr. Allen did, and since the Mexican and Honduranian birds are the same, Ridgway's name with nearly a year's priority takes precedence.

Thamnistes anabatinus anabatinus Scl. and Salv.

Thamnistes anabatinus Sclater and Salvin, P. Z. S., 1860, p. 299 (Choctum and Vera Paz, Guatemala).

A female, 1,200 feet, 10 February, a male 29 March, both at Lancetilla. Like several other Central American Ant-birds this species appears to be much more common in Costa Rica and Panama than toward the northern limits of its range. The two specimens listed here, both obtained in heavy open forest, were the only representatives met with, and constitute the first records for Honduras. These birds agree with specimens from British Honduras, undoubtedly representing typical *anabatinus,* and extend the range of that race. There is still, however, a considerable gap, from which no specimens are available, between the present known southern limit of the range of the northern form and the northern known limit of *saturatus* in Costa Rica.

Myrmotherula schisticolor schisticolor (Lawr.)

Formicivora schisticolor Lawrence, Ann. lyc. nat. hist. N. Y., **8**, 1867, p. 172 (Turrialba, Costa Rica).

A single specimen of this species was secured from a mixed forest flock at an elevation of about 1,000 feet in the hills east of Lancetilla. This was the only example secured; apparently this bird too is more numerous further south than near the northern limit of its range which is Guatemala. There is no previous record for Honduras.

Formicarius analis intermedius Ridgw.

Formicarius moniliger intermedius Ridgway, Proc. biol. soc. Wash., **21**, 1908, p. 194 (forest near Manatee Lagoon, British Honduras).

Bangs shot an adult female at an elevation of about 1,500 feet in humid forest on the hills east of Lancetilla.

This bird agrees with specimens from British Honduras; it in no way resembles *umbrosus*, the race of eastern Costa Rica and Nicaragua. Where the two races meet is not yet known. The species is here recorded from Honduras for the first time.

FURNARIIDAE

Synallaxis erythrothorax erythrothorax Scl.

Synallaxis erythrothorax Sclater, P. Z. S., 1855, p. 75, pl. 86 (Coban and Honduras).

Eight specimens, both sexes, were collected at Lancetilla 15 January to 30 March. The Rufous-breasted Spinetail is a fairly common species in the bushy lowlands of the Tela region. It is a bird of the dense thickets, not particularly shy or secretive, but unresponsive to "squeaking." However, if the collector remains motionless near the bird's haunts, it will sooner or later show itself and is easily shot.

March 27 a pair was taken in the act of completing a nest, a hollow structure of twigs with a long tunnel entrance, the whole at least eighteen inches long and eight inches thick. March 30 another bird was shot at the same nest, a male with testes only slightly enlarged.

This species is previously recorded from Honduras only as far east as the Chamelicon River; it doubtless finds its eastern limit somewhere between Tela and Ceiba.

Automolus ochrolaemus amusos subsp. nov.

Three specimens, both sexes, Lancetilla 14 January, 17 and 23 March.

Type.— Adult male, No. 136726 M. C. Z., collected at Lancetilla, Honduras (500 feet elevation), 23 March 1928 by James L. Peters (orig. no. 5556).

Characters.— Similar to *A. o. cervinigularis* (Scl.) but much paler throughout, especially the pileum, sides of head and underparts; the feathers on the lower border of the throat much less (sometimes not at all) edged with dusky. Similar also to *A. o. exsertus* Bangs, but somewhat darker, especially the throat, and with the supraorbital stripe much more prolonged posteriorly. Very much paler than *hypophaeus* Ridgway of eastern Costa Rica.

Remarks.— Ridgway (Birds of North and Middle America, pt. 5, 1911, p. 218 note) first pointed out the differences that separate this form from that of Mexico, but his series was too inadequate to confirm the characters. I have been fortunate in having for comparison a series of sixteen birds from Vera Cruz, British Honduras and Honduras, all of them collected within the last three years. Compared with birds that have lain in the museum for twenty-five years or more, the

gradual change of color in these older skins is very noticeable, the deep olive brown on the back of the fresh birds giving way to a more reddish brown, while the change in shade of the flanks is even more marked. It is necessary, therefore, to compare fresh with fresh and old with old to insure accurate comparison. A series of five birds, collected in the Cayo district, British Honduras, by Mr. O. L. Austin, Jr. in 1928, appears intermediate between this form and *cervinigularis*, but nearer the latter, while three old skins from eastern and southeastern British Honduras, after making due allowance for change of color, are intermediate also, but nearer *amusos*. The three birds collected at Yaruca, Honduras, by W. W. Brown in 1902, also belong to the form described here. Its range in the light of present knowledge extends from southern British Honduras to about the latitude of Ceiba in Honduras.

I suspect that this new bird will be found to average smaller than its northern representative, but the bulk of the material has been collected by a well-known professional, whose sexing is so notoriously inaccurate, that measurements based on it are misleading.

DENDROCOLAPTIDAE

Glyphorynchus spirurus pectoralis Scl. & Salv.

Glyphorynchus pectoralis Sclater and Salvin, P. Z. S., 1860, p. 299 (Vera Paz, Guatemala).

Three males, three females, Lancetilla 18 January to 22 March. This is not an uncommon species in the heavily forested hills, where it was found between elevations of 750 and 1,500 feet. It is a silent, unobtrusive bird, one or more of which attach themselves to the small forest flocks as they roam about. In actions *Glyphorynchus* is very much like a tree creeper (Certhia).

Hellmayr (Catalogue of Birds of America, pt. 4, 1925, p. 353, note c), points out characters for the birds from Costa Rica southward, differences which in his estimation, if confirmed, might prove to characterize a recognizable subspecies. Examination of a considerable series of *Glyphorynchus spirurus* in the Museum of Comparative Zoölogy from Vera Cruz to western Colombia furnishes the necessary proof of the constancy of the characters pointed out by Hellmayr and I name the bird

Glyphorynchus spirurus sublestus subsp. nov.

Type.— No. 141255 M. C. Z., adult male from Changuinola, northwestern Panama, (Caribbean slope), collected 16 October 1928 by H. Wedel (orig. no. 993).

Characters.— Similar to *G. s. pectoralis* but throat averaging darker, more cinnamomeous, less ochraceous; pale streaks on the posterior underparts narrower and less numerous.

Range.— Costa Rica southward at least to western Colombia, probably to western Ecuador and western Venezuela.

Material examined.— *G. s. pectoralis* — Vera Cruz: Buena Vista, 1 ♀. Guatemala: 1 "trade skin." Honduras: Lancetilla, 3 ♂, 3 ♀.

G. s. sublestus — Costa Rica: La Vijagua, 12 ♂, 11 ♀; Carillo, 3 ♀; Térraba valley, 5 ♂, 2 ♀, 1 not sexed. Panama: Caribbean slope of Volcan de Chiriqui (7,000 feet), 1 ♀; Chiriqui lagoon region, 4 ♂, 3 ♀; Darien, 5 ♂, 8 ♀. Colombia: Rio Cali, 1 ♂.

Dendrocincla anabatina anabatina Scl.

Dendrocincla anabatina Sclater, P. Z. S., 1859, p. 54, pl. 150 (Omoa, Honduras).

A male of this Woodhewer was taken 6 February at 1,200 feet in the hills near Lancetilla, while a female collected 19 March was shot in dense second growth in the valley; no other specimens were taken. *D. a. saturata* Carriker (Ann. Carn. mus., **6**, 1910, p. 649, El Pozo de Térraba) is not as well marked a form as might be imagined by a perusal of the original description. Carriker appears to have compared fresh skins with old, while the dusky spots on the tail tips are due to age. The only constant character by which to separate *saturata* is the more uniformly olive pileum, but rarely intermixed with ochraceous on the occiput.

Sittasomus griseicapillus sylvioides Lafr.

Sittasomus sylvioides Lafresnaye, Rev. et mag. zoöl., 1850, p. 590 ("Mexico"; State of Vera Cruz, designated by Bangs and Peters, 1928).

Edward Bangs killed a male Mexican Woodcreeper at an elevation of 1,200 feet in the hills east of Lancetilla; this was the only example met with.

Sittasomus griseicapillus gracilens Bangs and Peters (Bull. M. C. Z., **68**, no. 8, 1928, p. 392, Chichen Itza, Yucatan), a race characterized by smaller size and paler coloration, appears to range only through Yuca-

tan and eastern British Honduras. Birds collected in the Cayo district, western British Honduras, by Mr. O. L. Austin, Jr., are *S. g. sylvioides*; the Lancetilla example listed here is also indistinguishable from specimens from Vera Cruz.

Xiphorhynchus nanus confinis (Bangs)

Dendrornis nana confinis Bangs, Bull. M. C. Z., **39**, no. 6, 1903, p. 150 (Ceiba, Honduras).

Three specimens as follows: a male, Lancetilla, 1,200 feet, 6 February; a male, Lancetilla, 800 feet 23 March; a female, Lancetilla 29 March. These were the only ones encountered; all of them were found in the heavy forest.

Hellmayr (Catalogue of Birds of America, pt. 4, 1925, p. 293–300) considers *nanus, costaricensis* and *confinis* as subspecies of the South American *guttatus*, but it seems to me that the shorter, thicker and less decurved bill of the latter species renders it specifically distinct. If this character is of specific value, then the following forms from northern South America also should be regarded as races of *nanus: rosenbergi* Bangs of the Cauca valley, and *demonstratus* Hartert and Goodson of northwestern Venezuela. In any event the *nanus* group, as outlined here, is just as distinct from the *guttatus* group as the latter is from the *flavigaster* association.

Lepidocolaptes souleyetii insignis (Nels.)

Picolaptes compressus insignis Nelson, Auk, **14**, 1897, p. 54 (Otatitlan, Vera Cruz).

Bangs shot a male of this Wood Hewer on 13 March in the outskirts of Tela, and on 27 March I killed a female in low growth near the river at Lancetilla. In the field this species is very similar in habits and general appearance to the preceding species, but is less of a forest bird.

Dendrocolaptes certhia sanctaethomae (Lafr.)

Dendrocops sancti-thomae Lafresnaye, Rev. mag. zoöl., 1852, p. 466 ("Sanctae Thomae insula").

I shot a male of this species 12 March near Urraco (52 km. west of Tela). It was the only one of its kind encountered.

Lafresnaye believed that his type came from the island of Saint Thomas, where it most assuredly did not. Salvin and Godman (Biol.

centr. Am., **2**, 1891, p. 192) believed that this was a misinterpretation for the small Honduranian town of Santo Tomas, but it is extremely unlikely that this was so. However, since definite type localities must be fixed, it is just as well to adopt this suggestion of the authors of the Biologia and consider Santo Tomas, Honduras, as the type locality.

TYRANNIDAE

Platyrinchus cancrominus cancrominus Scl. & Salv.

Platyrhynchus cancrominus Sclater and Salvin, P. Z. S., 1860, p. 299 (Choctum, Vera Paz, Gautemala).

But two specimens of this curious little Tyrant Bird were secured: a male in the forested hills at an elevation of 750 feet near Lancetilla 6 February, and a female in dense jungle beside a path near the Tela River, also at Lancetilla 20 February.

Platyrinchus cancrominus dilutus Miller and Griscom (Am. mus. novit., no. 159, 1924, p. 4) is a slightly paler form which appears to be confined to northwestern Nicaragua.

Platyrinchus coronatus superciliaris Lawr.

Platyrhynchus superciliaris Lawrence, Ibis, 1863, p. 184 (Isthmus of Panama).

On 29 March I shot a female of this bird as it sat perched over a springy pool in open forest near Lancetilla. It was the only example either seen or secured. Its capture marks a considerable northward extension of range, since the bird has never been taken on the Caribbean slope of Central America, north of Costa Rica.

Tolmomyias sulphurescens cinereiceps (Scl.)

Cyclorhynchus cinereiceps Sclater, Ibis, 1859, p. 443 (Oaxaca, Mexico).

Bangs collected a female Flat-billed Flycatcher near Lancetilla on 5 February.

Todirostrum cinereum finitimum Bangs

Todirostrum cinereum finitimum Bangs, Proc. biol. soc. Wash., **17**, 1904, p. 114 (San Juan Bautista, Tabasco, Mexico).

Four specimens, both sexes, Lancetilla 18 January and 25 February. This bird is a rather common resident in the Lancetilla valley, where

it was almost invariably found in low dense thickets bordering streams. On 31 March a nest was found in an acacia growing on a gravel bar in the Tela River. The nest was suspended from the end of a twig about five feet from the ground; it was composed of fibres and rootlets; entrance was from the side. No eggs had been laid; in fact, the structure was almost transparent, the lining not having been applied.

Oncostoma cinereigulare (Scl.)

Todirostrum cinereigulare Sclater, P. Z. S., 1856 [1857], p. 295 (Cordova, Vera Cruz, Mexico).

On 31 January, I shot a single specimen, sex not determined, near Progreso. This bird was taken in a row of trees and bushes separating an abandoned section of banana land from a *potrero*. No others were secured.

While this species and *olivaceum* (eastern Panama to Colombia) are no doubt representative forms, the differences both in color, dimensions and proportions of the two are so great that they are best regarded as species as was done by Ridgway, and not as subspecies as Hellmayr considers them.

Pipromorpha assimilis assimilis (Scl.)

Mionectes assimilis Sclater, P. Z. S., 1859, p. 46 (Cordova and Guatemala. Cordova, Vera Cruz, Mexico is now accepted as the type locality).

A male of this Flycatcher was collected 30 January at Progreso at about the same spot where the Oncostoma was secured. Two additional males were shot at Lancetilla 20 and 23 March; both of the latter were in undergrowth in heavy forest on the hillsides.

Microtriccus semiflavus semiflavus (Scl. and Salv.)

Tyrannulus semiflavus Sclater and Salvin, P. Z. S., 1860, p. 300 (Choctum, Vera Paz, Guatemala).

On 6 February, at an elevation of about 1,200 feet in the hills east of Lancetilla, I came upon a large mixed flock of small birds, some feeding close to the ground, others high up in the tall trees. A very small bird some sixty feet over my head was shot and proved to be a female of this rare species. Whether it is really rare or whether it is always high up in the tallest trees, thereby escaping observation, I do not know — at all events it is of infrequent occurrence in collections.

I am not at all sure that Hellmayr (Birds of America, pt. 5, 1927, p. 482) is right in considering *Tyrannulus brunneicapillus* Lawrence as a subspecies of *semiflavus*. The two birds are very distinct, but the material available is too meager to enable me to dispute his conclusions.

Tyranniscus vilissimus parvus Lawr.

Tyranniscus parvus Lawrence, Ibis, 1862, p. 12 (Panama).

I shot a male and a female of this bird on 14 January in second growth bordering the Tela River above Lancetilla; no others were collected.

Both these specimens agreee with a series of *parvus* from Costa Rica and Panama not only in size but in coloration; they measure as follows: — ♂, wing 50; tail 44; bill from base 9.5; tarsus 17. ♀, wing 45; tail 36; bill from base 9.5; tarsus 15. One skin of *v. vilissimus* from Guatemala, sex not determined, gives wing 58; tail 51; bill from base 11.5; tarsus 17.5.

Salvin and Godman record *T. v. vilissimus* from "San Pedro," Honduras (Biol. Centr. Am. Aves, **2**, 1888, p. 33) and on the strength of this record that form is believed to be the race inhabiting Honduras. Either the identification or locality of Salvin and Godman's bird is wrong, for if San Pedro Sula, a town in the lowlands of the Chamelicon valley is meant, the probabilities are that the birds there would be *parvus*, though should their record refer to some tiny and abandoned "San Pedro" in the mountains it is quite probable that *vilissimus* would be the bird at higher elevations.

Myiozetetes similis superciliosus Bonap.

Tyrannus superciliosus "Swains." Bonaparte, P. Z. S., 1837 [= 1838], p. 118 (Mexico).

Muscicapa texensis Giraud, Sixteen spec. Texas birds, 1841, pl. 1 (Texas).

Four males and three females of Giraud's Flycatcher were collected at Lancetilla 16 January to 4 March, and a female at Tela 13 March. This is a common bird in the Tela region, frequenting almost any clearing, tall trees along the water courses, or suitable situations bordering the railroad right of way.

There is no alternative but that of accepting Bonaparte's name for this bird over Giraud's. Swainson described (Orn. draw., pt. 4, 1836, pl. 46) *Tyrannula superciliosa* which is now regarded as a synonym of *Muscicapa trivirgata* Wied [= *Conopias trivirgata trivirgata* (Wied)].

In the P. Z. S. for 1837 Bonaparte used *Tyrannus superciliosus* under the misapprehension that he was dealing with the same bird described by Swainson a year or two previously, *but*, although Bonaparte credited this name to Swainson, he placed it in a different genus, so it cannot be regarded as a homonym, and as he described the bird his name is not a *nomen nudum*, and having three years priority over Giraud's *texensis*, the latter name must go into synonymy. These facts were first pointed out by Nelson (Auk, **17**, 1900, p. 124) who had the temerity to violate the sanctity of Giraud's work, but for some reason his perfectly sound change was not adopted, and as a result a nomenclatural error that a child could detect has been perpetuated for nearly another generation.

Pitangus sulphuratus guatimalensis Lafr.

Saurophagus guatimalensis Lafresnaye, Rev. et mag. zoöl., 1852, p. 462 (Guatemala).

A common bird, noisy and conspicuous, throughout the region about Tela, absent from the forest or heavy second growth. Males were taken at Tela 29 February and 5 March and a female at Martinez Creek, 34 km. west of Tela, on 27 February.

Birds from southern Texas and western and northern Mexico (Sonora, Sinaloa, Colima, Oaxaca [Chihuetan], Tamaulipas and Vera Cruz [Orizaba and Motzorongo]) have paler yellow underparts and lighter olive-brown upper parts and average larger. They may be distinguished under the name of *Pitangus sulphuratus derbianus* (Kaup), type locality Zacatecas, Mexico, while Lafresnaye's name quoted above is applicable to the bird of extreme southern Mexico, south to Costa Rica and western Panama (Caribbean slope). The type of *guatimalensis* is in excellent condition and unfaded; it certainly represents the more deeply colored southern form. Specimens from the extreme southern range of the subspecies average a trifle darker but are best placed with *guatimalensis*.

Myiodynastes luteiventris luteiventris Scl.

Myiodynastes luteiventris Sclater, P. Z. S., 1859, p. 42 (Vera Paz, Guatemala and Orizaba, Mexico).

I shot a male at Lancetilla 28 March and a pair near the same spot 31 March. Although actively engaged in field work in the region about Tela and especially in the Lancetilla valley from the middle of January this species was not seen until 26 March when I observed a specimen

feeding with other species in a small wild fig tree on the outskirts of Tela; the bird shot two days later was in a small tree in a pasture, which we passed three times a day. I am inclined to suspect that the Sulphur-bellied Flycatcher may be partly migratory, even in the Central American portion of its wide range.

Megarynchus pitangua mexicanus (Lafr.)

Scaphorhynchus mexicanus Lafresnaye, Rev. et mag. zoöl., 1851, p. 473 (Mexico).

Boat-billed Flycatchers were found only at Lancetilla, where a pair was collected 9 February and a male 3 March. Very few others were noted. The birds shot 9 February were together in a tall dead tree towering above the second growth on one of the spurs running out from the hills forming the western rim of the valley; the other example was shot by Bangs in an isolated pasture tree. The female collected 9 February lacks the yellow pigment in her plumage, the underparts being whitish, faintly washed with straw yellow, while the olive of the upper parts is replaced by gray of a shade similar to that of the back of *Tyrannus tyrannus;* the crown patch is a dull reddish brown.

Myiobius sulphureigygius aureatus Bangs.

Myiobius xanthopygus aureatus Bangs, Proc. N. E. zoöl. cl., **4**, 1908, p. 27 (Divala, western Panama).

Two specimens of this Flycatcher were taken in the forested hills near Lancetilla: a male at 750 feet, 6 February, and a female at 1,200 feet, 22 March.

This bird has one structural peculiarity that, so far as I am aware, has not been published: it is almost impossible to skin a Myiobius over its head, and it would be entirely impossible, were it not for the fact that the brain case is not a hard bony structure, but of a thick semi-pliable (almost leathery) type of bone.

Empidonax albigularis australis Mill. and Grisc.

Empidonax albigularis australis Miller and Griscom, Am. mus. novit., no. 159, 1925, p. 5 (San Rafael del Norte, Nicaragua).

On 27 March, while passing a weed-grown pasture through which a trail led to the house that Bangs and I occupied at Lancetilla, I shot a strange-looking small Empidonax that upon dissection proved to be a

female. Although I had been constantly on the lookout for members of this genus, and shot them on sight, the campaign yielded but four other specimens, all belonging to the next two species listed.

This example agrees closely with the original description of *australis* and with a strictly comparable specimen of that race from Costa Rica. *Empidonax albigularis* is a rare bird, and the records for it are scattered geographically, though no doubt it will eventually be found to enjoy practically continuous distribution from Vera Cruz to Panama. The present record extends the known range of the subspecies from northern Nicaragua; the nearest record geographically for the typical form is Coban, Guatemala.

Empidonax traillii traillii (Aud.)

Muscicapa traillii Audubon, Birds of America, folio ed., **1**, 1828, pl. 45 (woods along the prairie lands of the Arkansas River, Arkansas).

I shot an Alder Flycatcher, sex not determined, at Lancetilla 25 February. The bird is in a very worn state of plumage.

Empidonax minimus (Baird and Baird)

Tyrannula minima Baird and Baird, Proc. ac. nat. sci. Phila., **1**, 1843, p. 284 (Carlisle, Pennsylvania).

Three Least Flycatchers, all females, were taken as follows: Progreso 31 January; Tela (5 km. west) 21 February; Lancetilla, 29 March. The last is undergoing a prenuptial molt involving the body tracts and tail; the primaries are worn, but secondaries and wing coverts appear fresh.

Myiarchus crinitus (Linn.)

Turdus crinitus Linné, Syst. nat., ed 10, **1**, 1758, p. 170 (Carolina).

A male, Lancetilla 16 January; two females, Lancetilla 26 February.

Our general practice was to shoot any Myiarchus (except *nigricapillus* after the first week) on sight. The three Crested Flycatchers given here were the only ones positively identified.

Myiarchus tyrannulus nelsoni Ridgw.

Myiarchus magister nelsoni Ridgway, Birds of North and Middle America, pt. 4, 1907, addenda, p. 903 (Alta Mira, Tamaulipas).

A single female of this bird was taken near Tela 26 March; no others were found. The species has been previously recorded from several

points on the coast of northern Honduras, but never more than a single bird from each locality, though Sclater lists (Catalogue of Birds of British Museum, **14**, 1888, p. 251) nine specimens in the Salvin-Godman collection taken on Ruatan Island by George Gaumer.

Myiarchus tuberculifer nigricapillus Cab.

Myiarchus nigricapillus Cabanis, J. f. O., 1861, p. 250 (Costa Rica; Bonilla, eastern Costa Rica, designated as type locality by Miller and Griscom, Am. mus. novit., no. 159, 1925, p. 7).

Sixteen specimens, both sexes, Lancetilla and Tela, 14 January to 30 March. Cabanis' Flycatcher is a very common resident throughout the Caribbean lowlands in the region about Tela. It is absent from the heavy forest, but occurs in practically all other situations.

In order to identify the series noted above, it has been necessary to study the considerable number of skins representing all the Mexican and Central American races of *Myiarchus tuberculifer* in the Museum of Comparative Zoölogy. The results, while agreeing in the main with those obtained by Miller and Griscom (supra), are sufficiently different to make it of interest to place them on record here.

Myiarchus tuberculifer lawrencii (Giraud). This subspecies does not occur south of the Isthmus of Tehuantepec.

M. t. connectens Miller and Griscom is a valid race, but does not occupy the wide range originally assigned to it. It appears to extend from southern Mexico through Guatemala, western British Honduras, Salvador, southwestern Nicaragua and perhaps northwestern Costa Rica.

M. t. nigricapillus ranges on the Caribbean slope from southeastern British Honduras south to the Talamanca valley in Costa Rica, and occupies the greater part of northern and western Costa Rica south to the Térraba valley. Additional topotypical material of this race might necessitate the naming of the birds inhabiting the northern portion of the range as outlined here.

M. t. bangsi Nelson not only occupies southwestern Costa Rica but extends across to the Caribbean slope in extreme southeastern Costa Rica and the Almirante Bay region of Panama.

Tyrannus melancholicus chloronotus Berl.

Tyrannus chloronotus Berlepsch, Proc. int. orn. congr., 1907, p. 474 (Temax, Yucatan).

Seven specimens, both sexes, Lancetilla and Tela, 16 January to 8 March. Lichtenstein's Kingbird is one of the very common, familiar

species in the region about Tela. It is primarily a bird of the open, being found along the larger streams, the railroad right of way where it perches on the telephone wires, and in the pastures where tall isolated trees provide suitable perches.

For a useful review of the races of *Tyrannus melancholicus* Vieill. *cf.* Bangs and Penard, Bull. M. C. Z., **64**, no. 4, 1921, p. 377–382.

PIPRIDAE

Pipra mentalis mentalis Scl.

Pipra mentalis Sclater, P. Z. S., 1856, p. 299, pl. 121 (Cordova, Vera Cruz).

Eight specimens, both sexes, Lancetilla 14 January to 20 March. The Red-headed Manakin is a common resident, equally at home in the second growth woods of the river valleys, or the heavy forests where it ranges to the summit of the surrounding hills which, in the immediate vicinity of Tela attain an elevation of about 1,800 feet. The males are very conspicuous, never being still or silent for a moment; the females are much more quiet, but for this very reason are often collected inadvertently, since their lack of distinguishing marks make them difficult to identify in the field.

Manacus candei (Parzud.)

Pipra candei Parzudaki, Rev. zoöl., 1841, p. 306 (Truxillo, Honduras).

Seven specimens, both sexes, Lancetilla 21 January to 20 March. This Manakin is a common species, though not quite as numerous as the preceding. It is a bird of the moist lowland thickets in the valleys. The note of the male is a loud explosive "pop"; the short flights that the males make are accompanied by a distinct *whirr*, produced no doubt by the attenuated outer primaries. What has been said of the female of *Pipra mentalis* applies equally to the female of the present species; the two birds bear a close resemblance to one another in the field, but Manacus can always be distinguished by the orange legs.

In the Proc. N. E. zoöl. cl., **3**, 1903, p. 106, Bangs described *Manacus candei electilis* from Buena Vista, Vera Cruz. This name has been relegated to synonymy by all writers since that time. The color characters are due to season — all three of Bangs' males (he had no females for comparison) were taken in June, and the pale yellow of the posterior underparts, the chief character on which *electilis* was based, is matched by Costa Rican examples taken at the same season. There is a descending scale of measurements as one passes from north to south throughout

the range of the species, but the difference is very small. Perhaps an adequate series from Vera Cruz might uphold *electilis* as a slight geographic race on the basis of larger size, but in the light of present material it must remain a synonym.

Schiffornis turdinus veraepacis (Scl. and Salv.)

Heteropelma verae-pacis Sclater and Salvin, P. Z. S. 1860 p. 300 (Choctum, Vera Paz, Guatemala).

The only specimen of this species secured was a male shot 14 March in the heavy forest at an elevation of about 700 feet in the hills east of Lancetilla. Another bird was seen at the same spot a few days before but was only wounded and escaped. Schiffornis appears to be much less numerous in Honduras than in the more southern parts of its range. It is, of course, an exceedingly inconspicuous bird in the field, sluggish and dull-colored. It is readily overlooked in the shadows of the forest. It possesses a very sweet whistled note, recalling that of some of the Solitaires (*Myiadestes*).

Carriker (Am. Carn. mus., **6**, 1910, p. 678) is quite correct in considering *S. v. dumicola* (Bangs) (Proc. N. E. zoöl. cl., **3**, 1903, p. 103) a synonym of *veraepacis*. The color characters are entirely individual, and the shorter tail, supposed to distinguish *dumicola*, breaks down as a character when adequate series are compared.

Laniocera rufescens rufescens (Scl.)

Lipaugus rufescens Sclater, P. Z. S., 1857 (1858), p. 276 (Coban, Vera Paz, Guatemala).

On 6 February I shot an adult male of this rare bird in heavy forest at 1,200 feet elevation in the hills east of Lancetilla. No other examples were noted.

I do not agree with Mr. Ridgway's view that the shiny blue-black tipped feathers found scattered on some specimens represent traces of an immature plumage, but consider that such birds are indicative of a plumage quite different from that now worn by the species and which has been lost.

COTINGIDAE

Tityra semifasciata personata Jard. and Selb.

Tityra personata Jardine and Selby, Illustr. orn., **1**, pt. 2, 1827, pl. 24 (Real del Monte, Hidalgo, Mexico).

This stocky gray and black Cotinga is not uncommon in the open and semi-open lowlands in the Tela region. Six examples were secured

at Lancetilla and Tela 21 January to 26 March. These birds average very slightly smaller than Mexican examples, but otherwise are indistinguishable from practically topotypical *personata*.

Platypsaris aglaiæ hypophæus Ridgw.

Platypsaris aglaiæ hypophæus Ridgway, Proc. U. S. nat. mus., **14**, 1891, p. 467 (San Pedro Sula, Honduras).

Bangs shot a female Becard at Lancetilla 24 February. The bird was at the edge of a clearing in second growth close by the river. The single specimen, in its coloration below, is exactly like birds from Ceiba, Honduras, identified by Ridgway as *hypophæus*; it is much paler above, however, and the pileum is blackish gray of a shade lighter than in the Pacific slope *latirostris*. I strongly suspect that this grayness of the pileum is due chiefly to immaturity, since this condition is to be found in any long series of any of the races of *Platypsaris aglaiæ*.

Pachyrhamphus polychopterus cinereiventris Scl.

Pachyrhamphus cinereiventris Sclater, Cat. American Birds, 1862, p. 242 (Santa Marta, Colombia).

The Gray-bellied Becard appears to be a less common bird in Honduras and Guatemala than in the more southern part of its range. According to Carriker it is more numerous in western Costa Rica than on the Caribbean slope of that country. Bangs shot a male at Lancetilla 13 March and I killed a second male at Tela 28 March. Both birds were in the lowlands in clearings beside small streams. The alleged differences on which the Central American races *similis* Cherrie (*Pachyrhamphus similis*, Proc. U. S. nat. mus., **14**, 1891, p. 343) and *tantulus* Bangs and Penard (*Pachyrhamphus polychopterus tantulus*, Proc. biol. soc. Wash., **31**, 1921, p. 78, new name for *Pachyrhamphus polychopterus constaricensis* Chubb, preoccupied) are founded have been well explained by Carriker (Ann. Carn. mus., **6**, 1910, p. 668). I see no other alternative but that of regarding as a single subspecies the form of *Pachyrhamphus polychopterus* ranging from Guatemala to northern Colombia. Bangs and Penard in their review of the races of *P. polychopterus* (Bull. M. C. Z., **64**, no. 4, 1921, p. 382–393), while retaining *similis* and *costaricensis* (= *tantulus*) as distinct races, pointed out that the differences were apparent only in series and intimated that the two races would probably not stand. While Bangs and Penard had a very large series assembled at the time they wrote their review, Mr. Bangs tells me now that he believes the splits of the Central American races of this species to be altogether too close.

Lathria unirufa unirufa Scl.

Lipaugus unirufus Sclater, P. Z. S., 1859, p. 385 (Playa Vicente, Oaxaca (or Vera Cruz?) Mexico).

Four males of this large Cotinga were taken in the heavy forest on the slopes of the Lancetilla valley, at elevations ranging from 300 to 1,200 feet. These specimens constitute the first Honduranian records. I found this bird to be rather uncommon and exceptionally wary. The note is a loud cry, very carrying, and is often given in response to the sound of the blows of a machete or an axe against a log.

Chapman has already pointed out (Bull. A. M. N. H., **36**, 1917, p. 494) that he cannot distinguish specimens of *Lathria unirufa* from Ecuador and Colombia, on the one hand, from Panamanian examples on the other. In this view I agree and state further that Costa Rican specimens cannot be told from birds from Panama. For this reason I unite the birds of northwestern South America with those of the two southern Central American republics under the name of *castaneotinctus* (Hartert, Nov. zoöl., 1902, p. 610, Paramba, n. w. Ecuador) which has priority over *clara* (Ridgway, Proc. biol. soc. Wash., **19**, 1906, p. 120 ("Panama"). The typical form ranging from southern Vera Cruz at least to Honduras and possibly farther, is easily distinguished by its somewhat larger size and browner, less reddish tone, to the plumage. Worn birds acquire a clay-colored caste, together with a general dulling of the colors, that produces a very different appearing bird.

Lipangus holerythrus holerythrus (Scl. and Salv.)

Lipaugus holerythrus Sclater and Salvin, P. Z. S., 1860 (Choctum, Vera Paz, Guatemala).

On 14 January, the first day I collected in Honduras, I shot a female of this species at the edge of a clearing in second growth land bordering the Tela River at Lancetilla. No other examples were met with. Brown secured only a pair at Yaruca, but the few other collecters who have worked in Honduras do not seem to have found the bird at all; thus it would seem that the species is much less numerous in Honduras than in Costa Rica for example, where Carriker calls it the "most abundant of the Cotingas."

Attila spadiceus flammulatus Lafr.

Attila flammulatus Lafresnaye, Rev. zoöl., 1848, p. 47 (Colombia, *error*. Vera Cruz, Mexico, substituted as type locality by Bangs and Penard, Proc. biol. soc. Wash., **35**, 1922, p. 223).

On 6 February I shot a male *Attila* at an elevation of about 750 feet in the forest east of Lancetilla. In my experience this is an uncommon

bird in Central America; while generally distributed, it is nowhere common.

The subject of the color phases of the species has been dealt with by Dr. Stresemann (J. f. O., **73**, 1925, p. 274–277), that of geographic variation by Messrs. Miller and Griscom (Am. mus. novit., no. 183, 1925, p. 11–14).

Cotinga amabilis Gould

Cotinga amabilis Gould, P. Z. S., 1857, p. 64, pl. 123 (Guatemala).

The Blue Cotinga has been recorded in Honduras from Chasniguas, Los Caminos and La Ceiba; at the latter place W. W. Brown collected over fifty specimens in about two weeks, all from the same tree. The only evidence that this species occurs in the Tela region was the finding of a few contour feathers from an adult male. These relics were picked up off the ground at the edge of the forest just east of the experiment station at Lancetilla.

HIRUNDINIDAE

Iridoprocne bicolor (Vieill.)

Hirundo bicolor Vieillot, Ois. Am., Sept., **1**, 1807, p. 61, pl. 31 (eastern United States).

Tree Swallows were observed in considerable numbers on the Toloa swamp 10 and 11 March. These records mark a considerable southward extension of the winter range of this bird, the species not being hitherto recorded below Guatemala and British Honduras. As a general rule I am strongly opposed to giving serious consideration to sight records beyond the known or normal range of a bird, but in this case I see no reason for doubting such a record. I am perfectly familiar with Tree Swallows in life; besides these birds were seen at very close range and from all angles, both in flight and at rest, and all the field characters were plainly noted.

Progne chalybea chalybea (Gmel.)

Hirundo chalybea Gmelin, Syst. nat., **1**, pt. 2, 1789, p. 1026 (Cayenne).

A pair of Gray-breasted Martins was taken near Martinez Creek, 34 km. west of Tela, 27 February, and a female at Tela 26 March.

This species is not uncommon in the region about Tela, where it is found near swamps and rivers. In such situations the birds are invariably found on dead trees or on trees with hollow limbs.

Stelgidopteryx ruficollis serripennis (Aud.)

Hirundo serripennis Audubon, Orn. biog., **4**, 1838, p. 593 (Charleston, S. C.).

Seven Rough-winged Swallows were taken at Lancetilla between 14 January and 30 March. None of these birds represents the breeding bird or the region, not even the male collected on 30 March; all are referable to the bird of the United States with one exception. This last specimen, taken 8 February, is much larger than examples from the United States, its wing of 121 mm. exceeding that of two males of *ridgwayi* from Vera Cruz by 3 and 4 mm. respectively, and greatly exceeding any of a large series of typical *serripennis*. In color it is very slightly darker than *serripennis*. It seems to me to represent a bird from some indeterminate region, but the case is best dealt with by calling attention to the differences mentioned. The question of the ranges of the races of *Stelgidopteryx ruficollis* in Mexico and Central America is a most perplexing one.

TROGLODYTIDAE

Heleodytes capistratus castaneus (Ridgw.)

Campylorhynchus castaneus Ridgway, Proc. U. S. nat. mus., **10**, 1888, p. 507 (Spanish Honduras).

This bird was found only at Progreso, where an adult female was collected 31 January.

Although Ridgway himself repudiates *castaneus*, considering it indistinguishable from the Costa Rican *capistratus*, after an examination of the type of the former race, together with eight additional specimens from Honduras (San Pedro Sula and Chamelicon) kindly loaned by the U. S. National Museum, I am of the opinion that *castaneus* is a valid race. Comparing ten specimens of *castaneus* from northern Honduras with sixteen of *capistratus* from Costa Rica — sex for sex and season for season — the former birds are characterized much as Ridgway originally diagnosed them: the concealed portion of the back and scapular feathers less heavily and distinctly (often not at all) marked with black and white; the rump markings confined to the concealed portion of the feathers; in fresh plumage the upper tail coverts average

less distinctly barred. In worn plumage the Costa Rican birds have a very spotted appearance above, while birds from northern Honduras in a similar state of feather are a much more uniform brown. Specimens in worn summer dress from the Honduras-Nicaragua boundary, 180 miles from the Pacific coast, are referable to *H. c. capistratus*.

Pheugopedius maculipectus umbrinus (Ridgw.)

Thryothorus maculipectus umbrinus Ridgway, Man. North American Birds, 1887, p. 552 (Guatemala).

Five males, two females, Lancetilla 16 January to 4 March.

This Wood Wren is one of the common birds in the Tela region, inhabiting the lowlands in a variety of situations, though it is absent from the heavy forest. It is not a bold bird, and does not choose an exposed perch from which to deliver its ringing song, nevertheless it is curious, and very easily "squeaked." It is this species whose song predominates in the bird chorus, being a loud, strong singer, frequently heard even through the middle of the day. Often several birds may be heard at the same time.

The transition between *P. m. maculipectus* of southern Mexico and *P. m. umbrinus* takes place over a wide area, resulting in a broad region of intermediacy, many of the birds in which might be referred to either race.

Troglodytes musculus intermedius Cab.

Troglodytes intermedius Cabanis, J. f. O., 1860, p. 407 (San José, Costa Rica).

On 22 February I shot a male of this wide-ranging Central American House Wren at Lancetilla, and on 13 March another male at Tela. The species is rather uncommon; its usual haunts are about houses in clearings and in the smaller towns; it was once observed in a large *potrero*. It is absent from the forests, second growth and banana lands.

The two specimens collected are practically identical with topotypical *intermedius* from Cartago, Costa Rica, when allowance is made for difference in color due to wear, the Honduras birds being in fresh winter plumage, while the Costa Rica birds were taken in May and have the plumage abraided, especially above.

Henicorhina prostheleuca tropaea Bangs and Peters

Henicorhina prostheleuca tropaea Bangs and Peters, Bull. M. C. Z., **67**, no. 15, 1927, p. 480 (La Vijagua, Costa Rica).

Three males, two females, Lancetilla 17 January to 29 March. Henicorhina is not uncommon in the heavy forest in the Lancetilla

valley, both in the lowlands and in the hills, wherever the condition of the surface is suitable. Where the forest floor is free from rocks, fallen logs or heavy undergrowth the bird is absent, but delights in spots where there are outcrops of rocks or where the ground is littered with fallen logs and luxuriant underbrush. It is an almost exclusively terrestrial species and seems to occupy much the same niche in the tropical forests that the Winter Wren (*Nannus hiemalis*) does in the Canadian zone woodlands of North America.

The five specimens listed here are not quite typical of *tropaca*, but are nearer to that form than to typical *prostheleuca;* a pair from Yaruca, Honduras, collected twenty-five years ago, are identical with topotypical *tropaca*. There is a gradual accumulation of evidence to show that certain subspecies supposedly restricted to southern Mexico actually extend southward into the highlands of eastern Guatemala and western British Honduras (perhaps even farther); *Henicorhina prostheleuca* is such a species, but in spite of the large amount of material available, very little of it is from the critical regions and the final elucidation of faunal limits in northern Central America requires more field work.

MIMIDAE

Dumetella carolinensis (Linn.)

Muscicapa carolinensis Linné, Syst. nat., ed. 12, **1**, 1766, p. 328 (Carolina).

The Catbird is a not uncommon winter visitor in the region about Tela. Two specimens were procured: one at Lancetilla 18 January, another at Progreso 30 January.

TURDIDAE

Turdus grayi grayi Bonap.

Turdus Grayi Bonaparte, P. Z. S., 1837 (1838), p. 118 (Guatemala).

Four males of Gray's Thrush were secured: three at Lancetilla 20 January to 23 February and one at Tela 28 March.

This is a rather common bird of the valleys where the heavy forest has been cleared away. Its favorite haunts are where small streams trickle through the banana lands, with here and there a somewhat taller tree overtopping the rest, providing a singing perch for the males. They are more active at dawn and dusk, often coming out into the open to feed on the grounds at that time, but generally retire during

the day. The bird shot at Tela was feeding with a number of species, besides other members of its own kind, in a small wild fig tree thickly loaded with fruit.

Hylocichla mustelina (Gmel.)

Turdus mustelinus Gmelin, Syst. nat., **1**, pt. 2, 1789, p. 817 (New York).

On 7 March I saw, but did not shoot, a Wood Thrush beside the Tela-Yoro road, close by the former town. This species has been previously recorded from Honduras by Bangs (Bull. M. C. Z., **39**, no. 6, 1903, p. 152) on the basis of seven specimens collected at Ceiba and Yaruca by W. W. Brown.

SYLVIIDAE

Ramphocaenus rufiventris rufiventris (Bonap.)

Scolopacinus rufiventris Bonaparte, P. Z. S., 1837 (= June, 1838), p. 119 (Guatemala).

On 25 March I shot a female of this peculiar bird at an elevation of about 500 feet in the forested hills near Lancetilla. This specimen, which was feeding among some vines about thirty feet from the ground, was the only one encountered in the three months of my stay.

For the reasons for removing *Ramphocaenus* from the Formicariidae and transferring it to an oscine family, the reader is referred to Miller, Am. mus. novit., no. 140, 1924, p. 3 and 6, and to Chapman, Bull. Am. mus. nat. hist., **55**, 1926, p. 560.

VIREONIDAE

Vireo virescens Vieill.

Vireo virescens Vieillot, Ois. Amer., Sept., **1**, 1807, p. 84, pl. 53 (no type locality, Pennsylvania designated by Bangs and Penard, Bull. M. C. Z., **67**, no. 3, 1925, p. 205).

I shot a male Red-eyed Vireo at an elevation of 1,200 feet in the hills east of Lancetilla 25 March. The bird was moving actively about, fifty feet from the ground, in some of the smaller forest trees.

Vireo griseus griseus (Bodd.)

Tanagra grisea Bodd., Table, pl. enlum., 1783, p. 45 (Louisiana).

On 7 March I shot a male and a female White-eyed Vireo at Tela, the birds appeared to be a mated pair; a week later a singing male was

taken near the same spot. Neither of the males is distinguishable from birds from the eastern United States, though the female is extremely small. The wings and tails of all three specimens are considerably abraided. The gonads of none of the birds showed any trace of sexual activity.

Hylophilus decurtatus pusillus Lawr.

Hylophilus pusillus Lawrence, Ann. lyc. nat. hist. N. Y., **7**, 1862, p. 323 (Panama railroad).

I shot a female of this species 23 January in low second growth bordering a trail in the upper Lancetilla valley. The single specimen taken agrees with examples from Panama and Costa Rica rather than with birds from Vera Cruz and the highlands of British Honduras. Birds from the lowlands of British Honduras (Toledo district) are intermediate between *H. d. decurtatus* and *H. d. pusillus* (cf. Bangs and Peters, Bull. M. C. Z., **67**, no. 15, 1927, p. 483).

Under the International Code *Hylophilus* Temminck 1823 is not preoccupied by *Hylophila* Hübner 1816; consequently the use of *Pachysylvia* of Bonaparte (1850) must be discontinued.[1]

Hylophilus ochraceiceps pallidipectus (Ridgw.)

Pachysylvia ochraceiceps pallidipectus Ridgway, Birds of North and Middle America, pt. 3, 1904, p. 219 (Angostura, Costa Rica).

The Pale-breasted Pachysylvia appears to be an inhabitant of forests. It was found on three occasions in the hills east of Lancetilla and on each of these occasions the bird was a member of a mixed woodland flock. The first specimen, a female, was collected 6 February at about 750 feet, the next, sex not determined, was taken 10 February at about 1,000 feet, and the third, shot at a like altitude 22 February, was so badly hit by the charge that it could not be preserved. The position of this species in the mixed flock was in the upper twigs of the taller undergrowth.

As far as Central America is concerned, this bird has a distribution very similar to that of the last, though fitting into an entirely different ecological niche. Its distribution into two geographical races from

[1] Since the above went to press Todd's Review of the Vireonine genus Pachysylvia (Proc. biol. soc. Wash., **42**, 16 July 1929, p. 181–206) has appeared. I cannot agree with him in retaining Pachysylvia as the current generic name of the group, nor in his "lumping" of the races of *decurtata*. The series of *ochraceiceps* available to me is not sufficient to enable me to substantiate or refute his conclusions in regard to the races of that species. His remarks regarding the nonvalidity of *P. o. pallidipectus* would have been more convincing had he listed his material.

Panama northward is along exactly the same lines as *H. decurtatus*. The two Honduranian examples before me obviously fit in with the paler form of northern Central America and not with the darker bird of Vera Cruz and the highlands of western British Honduras, while birds from the Toledo district of British Honduras are intermediate, but a trifle near to *H. o. ochraceiceps*. Ridgway (op. cit., p. 219) lists a specimen of the latter race from the Rio de las Piedras, Honduras.

MNIOTILTIDAE

Mniotilta varia (Linn.)

Motacilla varia Linné, Syst. nat., ed. 12, **1**, 1766, p. 333 (Santo Domingo).

The Black and White Warbler is an uncommon winter visitor in the Tela region. It appeared to be somewhat more numerous during the last two weeks in March, when there was evidence of more or less movement among the North American migrants.

Helmitheros vermivorus (Gmel.)

Motacilla vermivora Gmelin, Syst. nat., **1**, pt. 2, 1789, p. 951 (Pennsylvania).

On 15 January I shot a male Worm-eating Warbler at Lancetilla, the only time the bird was met with. It has not been previously recorded from Honduras.

Vermivora chrysoptera (Linn.)

Motacilla chrysoptera Linné, Syst. nat., ed. 12, **1**, 1766, p. 333 (near Philadelphia, Pa.).

A specimen of the Golden-winged Warbler, whose sex could not be determined, but which from the plumage is clearly a female, was collected 19 March at Lancetilla and constitutes the first Honduranian record.

Dendroica aestiva aestiva (Gmel.)

Motacilla aestiva Gmelin, Syst. nat., **1**, pt. 2, 1789, p. 996 (Canada).

A fairly common winter visitor from eastern North America. Specimens were taken at Lancetilla 9 February and 27 March.

Dendroica magnolia (Wilson)

Sylvia magnolia Wilson, Am. orn., **3**, 1811, p. 63, pl. 23, fig. 2 ("not many miles from Philadelphia").

The status of the Magnolia Warbler is the same as that of the preceding species. A male was taken 2 February and another 27 March, both at Lancetilla. The latter example is undergoing a prenuptial molt which involves all the anterior body tracts, the secondary coverts and the rectrices.

Dendroica coronata coronata (Linn.)

Motacilla coronata Linné, Syst. nat., ed. 12, **1**, 1766, p. 333 (Pennsylvania).

The Myrtle Warbler winters abundantly. A male was shot 17 March at Lancetilla as a matter of record.

Dendroica dominica albilora Ridgw.

Dendroica dominica var. *albilora* "Baird" Ridgway, Am. nat., **7**, 1873, p. 605 (Belize, British Honduras).

On 18 January I shot a Sycamore Warbler from a small cocoanut palm growing beside the railroad track near Lancetilla.

Oporornis formosa (Wils.)

Sylvia formosa Wilson, Am. orn., **3**, 1811, pl. 25, fig. 3 (Kentucky).

A Kentucky Warbler was seen at close range, but not secured, 19 March, and the day following I saw another but likewise failed to get it. Both birds were seen near Lancetilla in thick scrubby second growth. On 19 March an increase in the numbers of North American migrants in the Lancetilla valley became apparent.

Seiurus aurocapillus (Linn.)

Motacilla aurocapilla Linné, Syst. nat., ed. 12, **1**, 1766, p. 334 (Pennsylvania).

A few Ovenbirds were noted near Tela after the first of March, but none were collected.

Seiurus motacilla (Vieill.)

Turdus motacilla Vieillot, Ois. Am., Sept., **2**, 1807, p. 9, pl. 65 (Kentucky).

Bangs collected a fine male Louisiana Water Thrush near Lancetilla 5 February. This bird, the only one seen, was found hopping about on

the rocks in the swift-flowing Tela River at a point where it emerges from the forest to flow through the second growth.

Seiurus noveboracensis notabilis Ridgw.

Seiurus naevius notabilis Ridgway, Proc. U. S. nat. mus., **3**, 1880, p. 12 (Como Lake, Carbon Co., Wyoming).

I killed a Water Thrush, 21 February, in a small citrus plantation five kilometers west of Tela. Other representatives of the species were seen from time to time throughout the region, always frequenting the muddy banks of streams, but no more were secured owing to the wariness that these birds always display while in their winter home.

Geothlypis trichas brachidactyla (Swains.)

Trichas brachidactylus Swainson, Anim. in menag., 1838, p. 295 (northern provinces of the United States).

The Northern Yellow-throat is not an uncommon winter visitor. None were seen, however, in January, but the species seemed to increase in numbers after the middle of February.

Icteria virens virens (Linn.)

Turdus virens Linné, Syst. nat., ed. 10, **1**, 1758, p. 171 (off the coast of Carolina).

The only example of the Yellow-breasted Chat is a female in very badly worn plumage, collected 11 March, 52 km. west of Tela.

Wilsonia citrina (Bodd.)

Muscicapa citrina Boddaert, Table, pl. enlum., 1783, p. 41 (Louisiana).

A few Hooded Warblers were noted in the moist second growth woodlands in the Lancetilla valley; of these a female was collected 15 January.

Setophaga ruticilla (Linn.)

Motacilla ruticilla Linné, Syst. nat., ed. 10, **1**, 1758, p. 186 (Virginia).

Bangs shot a female or an immature male Redstart at Lancetilla 3 March, but the specimen was so badly hit that it was not preserved. The species was seen subsequently on a few occasions, but it cannot be classed as a common winter visitor.

Basileuterus culicivorus culicivorus (Licht.)

Sylvia culicivora Lichtenstein, Preis-Verz. Mex. Vög., 1830, p. 2 (Mexico).

Lichtenstein's Warbler is represented by two females, both collected in the forest on the hills east of Lancetilla; one was shot at 1,200 feet 17 January, the other at 750 feet 6 February.

While the typical race of *Basileuterus culicivorus* has been recorded from southern Mexico, Guatemala and Costa Rica it has never been noted from Honduras.

FRINGILLIDAE

Guiraca caerulea caerulea (Linn.)

Loxia caerulea Linné, Syst. nat., ed. 10, **1**, 1758, p. 175 (Carolina).

A Blue Grosbeak was seen at Lancetilla on several occasions during late February and early March. Migrants from further south arrived on 23 March when two more were seen and one of them, a female, was secured; the following day two males and three females were seen together at the experimental station, but had moved on by noon of the same day. The species was not encountered subsequently. Brown, in 1902, shot two specimens at Ceiba the middle of January and another at Yaruca 18 February.

Oryzoborus funereus Scl.

Oryzoborus funereus Sclater, P. Z. S., 1859, p. 378 (Suchapan, Oaxaca).

Eight specimens, both sexes, Lancetilla 17 January to 6 March.

Throughout the Tela region the Lesser Rice Grosbeak was found commonly in the grass and weeds bordering roadways, usually associated with the two species of Sporophila and with Volatinia. In the field the males look exactly like *Sporophila corvina* but are distinguishable by larger size and grotesquely heavy bill; the females are recognizable at a distance by the peculiar "snuff-colored" plumage. By early March the males are in full song. The song is a very pleasing melody of several seconds' duration, delivered from a high perch, usually a telephone wire, fence post or dead stub.

This species is remarkably constant in its characters over its wide range, which extends from southern Mexico to northern South America.

Sporophila morelleti morelleti (Bonap.)

Spermophila morelleti Bonaparte, Consp. av., **1**, 1850, p. 497 (Guatemala).

Five specimens, both sexes, Lancetilla and Tela, 18 February to 28 March.

In point of numbers this Seed-eater is the most abundant bird in the Tela region, occurring in flocks up to fifty or more individuals, wherever grasses and weeds grow extensively; it also occurs in the rank growth of grasses bordering drainage ditches and small sluggish streams. The mating season commences the latter part of February. At this time the males indulge in their canary-like song, pursue the females and engage in combat with rival males. The species, however, does not breed as a unit, since the flocks hold together throughout March. At Lancetilla a large flock numbering nearly 200 individuals roosted each night in a planting of bamboo. I should imagine that this species as well as Oryzoborus and *Sporophila corvina* must have greatly extended their range in Central America with the increase of cleared land incident to the increase in population. They are primarily birds of the open clearings, absent from the forest and even abandoning clearings that have reverted to second growth woodland.

Sporophila corvina (Scl.)

Spermophila corvina Sclater, P. Z. S., 1859, p. 379 (Playa Vicente, Oaxaca).

Eight specimens, four males and four females, of the Black Seed-eater, were collected at Lancetilla 15 January to 6 March. Of the four species of the associational group mentioned under *Oryzoborus funereus* (cf. *antea*) this is the least numerous; nevertheless it is far from uncommon.

Volatinia jacarini atronitens Todd

Volatinia jacarini atronitens Todd, Proc. biol. soc. Wash., **33**, 1920, p. 72 (Campeche, Campeche).

Seven specimens, both sexes, Lancetilla 2 to 26 February. This is a common bird of the grass and weed lands, especially in moist situations where the grass grows long and rank. Commonly associated with the three preceding species, it is much more quiet and secretive, especially when in short grass, where it often runs mouse-like over the ground, not flying until nearly trodden on. The males, when singing, do not perch above the level of their surroundings, nor do they ever choose as high a perch as the other species with which they associate.

Saltator atriceps atriceps Less.

Tanagra (Saltator) atriceps Lesson, Cent. zoöl., 1830, p. 208, pl. 69 (Mexico).

On 30 January I shot a male and two females of the large Saltator in an extensive patch of weeds a short distance southeast of Progreso. The species was not noted elsewhere.

From Vera Cruz where *S. atriceps* occurs in its most marked characteristics (complete black pectoral band and black auriculars) southward to eastern Costa Rica (from whence southward specimens of *Saltator atriceps* are referable to *S. a. lacertosus* Bangs) is a wide area of intermediacy between the two forms. The birds even from the same localities in this intermediate region vary to such an extent *inter se* that the naming of a race from that area is unwarranted, and I agree to the distribution assigned to this species by Ridgway in 1901 (Birds of North and Middle America, pt. 1, p. 561–563), but, of course, recognizing *S. a. raptor* (Cabot) the bird of Yucatan and adjacent parts of British Honduras.

Saltator magnoides magnoides Lafr.

Saltator magnoides Lafresnaye, Rev. zoöl., 1844, p. 41 (Mexico, error. I designate southeastern Guatemala).

Five specimens of the smaller Saltator, a male, three females and one sex not determined, were taken in the Lancetilla valley 24 January to 4 March. This is a rather common bird in the bushy pastures in the Tela region.

Lafresnaye was mistaken about the origin of his type, now in the Museum of Comparative Zoölogy; it could not have come from Mexico as it does not agree with specimens from that country, but is the same as examples of the race extending from Guatemala to Costa Rica, which was named *Saltator magnoides medianus* by Ridgway in the first part of the Birds of North and Middle America (1901, p. 660, 664). Fortunately fixing the identity of Lafresnaye's *Saltator magnoides* onto the form occurring from Guatemala south to Costa Rica does not entail any serious alterations in nomenclature. The forms, from north to south, will stand

Saltator magnoides gigantodes Cabanis

Pileum grayish, usually washed with black anteriorly; buff throat-patch more restricted; black jugular band wider. Southern Mexico, in states of Vera Cruz and Oaxaca.

Saltator magnoides magnoides Lafresnaye

Pileum, particularly the posterior part, washed with green, the black wash when present confined chiefly to the forehead; buff throat-patch more extensive and black jugular band narrower. Guatemala to Costa Rica and Caribbean slope of northwestern Panama.

Saltator magnoides intermedius Lawrence

Pileum usually greenish, with a gray wash anteriorly; buff throat-patch more extensive; black jugular band much narrower, often broken; gray of underparts distinctly brownish. Southwestern Costa Rica, and western Panama (Chiriqui) to the Canal Zone.

Spiza americana (Gmel.)

Emberiza americana Gmelin, Syst. nat., **1**, pt. 2, 1789, p. 872 (New York).

There is not sufficient evidence at hand to determine the status of the Dickcissel as a migrant or as a winter visitor to the portion of Honduras under discussion in this paper. I strongly suspect that in the Caribbean lowlands the bird occurs only in migration. I did not meet with it in the region about Tela until 29 March, when two were seen together under most favorable circumstances at Lancetilla. Both birds were perched on a fence wire running beside the railroad track over which I was accustomed to pass six times a day. I feel certain that the birds were new arrivals from the south; they were not noted again. Several years ago when collecting in Quintana Roo, Dickcissels appeared for the first time 5 April.

Spiza americana has been collected on Ruatan Island (specimens in British Museum) and is also listed by Sclater (P. Z. S., 1870, p. 836) in a nominal list of species collected by George M. Whitley "on the coast of Honduras" (*i.e.*, the Chamelicon valley between Puerto Cabello and San Pedro).

Passerina cyanea (Linn.)

Tanagra cyanea Linné, Syst. nat., ed. 12, **1**, 1766, p. 315 (Carolina).

An Indigo Bunting was seen at Lancetilla 19 February and again the following day, when I shot it. The bird was a male of the previous year, molting into the first nuptial plumage. The species was not met with again until the last week in March, when several individuals were seen following an influx of North American migrants.

Passerina ciris (Linn.)

Emberiza ciris Linné, Syst. nat., ed. 10, **1**, 1858, p. 179 (America, restricted type locality, Carolina, ex Catesby).

Two male Nonpareils were seen almost daily after the first of March on a weed-covered slope below the house that Bangs and I occupied; the birds were associated with Sporophilas and Volatinia, but were much more wary than either. One was finally shot 30 March; the testes were slightly enlarged.

COEREBIDAE

Cyanerpes cyaneus cyaneus (Linn.)

Certhia cyanea Linné, Syst. nat., ed. 12, **1**, 1766, p. 188 (Brazil and Cayenne = Surinam ex Edwards, "Gleanings," p. 114, pl. 264, f. 1).

I found the Blue Honey Creeper only at Tela, where three adult males were collected and others seen on a certain small wild fig tree between 24 and 28 March. That this species is common and widespread is well attested by its abundance in collections, but it appears to be restricted in its food habits, and, therefore, may be absent from certain localities, when the feeding trees of the region are not in fruit.

If *Cyanerpes cyaneus carneipes* Oberh. (Auk, **16**, 1899, p. 33) is a valid race, then the Central American Blue Honey Creepers must be referred to it, but since it was described no authors have been able to substantiate the alleged characters upon which it was based.

Chlorophanes spiza guatemalensis Scl.

Chlorophanes guatemalensis P. L. Sclater, P. Z. S., 1861, p. 129 (Guatemala).

On 17 January I collected a female Green Honey Creeper in a forest at 1,200 feet altitude east of Lancetilla; the species was not seen again until 20 March when Bangs shot a pair at exactly the same spot.

THRAUPIDAE

Tanagra hirundinacea (Bonap.)

Euphonia hirundinacea Bonaparte, P. Z. S., 1837, p. 117 (Guatemala).

A male was taken at Progreso 30 January and a mated pair at Tela 7 March; no other examples were positively identified; the bird does not appear to be at all common in the region about Tela. The specimen shot at Progresso was in a narrow strip of woodland separating a banana plantation from a pasture; the birds taken at Tela were at the edge of scrubby jungle bordering a road.

Tanagra gouldi gouldi (Scl.)

Euphonia gouldi P. L. Sclater, P. Z. S., 1857, p. 66, pl. 124 (Guatemala).

Six specimens, both sexes, Lancetilla 14 January to 6 February.

Gould's Euphonia is a common species of general distribution, seemingly more numerous in the valley, where it frequents low jungle, but it also occurs in the forest on the hillsides, where one was taken at 500 feet and another at 1,200 feet.

Until specimens were taken on the Caribbean slope of northwestern Panama by Kennard and Smith in 1926 and by Benson and Wedel subsequently, *T. gouldi* was known to range southward only to southeastern Costa Rica, and no attempt had been made to subdivide the species. With a series of seventy-eight specimens from all parts of the known range of the species from Vera Cruz southward, it is clear that there is a recognizable race inhabiting the southern part of the range of the species that I name.

Tanagra gouldi praetermissa subsp. nov.

Type.— No. 234428 M. C. Z., from Western River, Almirante, Panama, collected 28 February 1926 by J. D. Smith.

Characters.— Similar to *Tanagra gouldi gouldi* Sclater but much smaller, the male with the chestnut abdominal area averaging less extensive.

Range.— Eastern Costa Rica from Port Limon to the eastern end of the Chiriqui lagoon in northwestern Panama.

Material examined

T. g. gouldi		
Vera Cruz	1 ♂	Wing 58
British Honduras	2 ♂	58–59.5 (58.75)
Guatemala	17 ♂	55–60 (58.3)
Honduras		
(Caribbean lowlands)	5 ♂	57–60 (58.3)
Average	25 ♂	57.4
Vera Cruz	1 ♀	59
Quintana Roo	1 ♀	54
British Honduras	2 ♀	57–57.5 (57.25)
Guatemala	11 ♀	53–57.5 (55.4)
Honduras		
(Caribbean lowlands)	7 ♀	55–57 (56.1)
Northwestern Costa Rica	1 ♀	55
Average	23 ♀	55.8

T. g. praetermissa		
Eastern Costa Rica	3 ♂	52–53.5 (52.75)
Northwestern Panama (Caribbean slope)	11 ♂	53–56 (54.1)
Average	14 ♂	53.8
Eastern Costa Rica	2 ♀	51–52 (51.5)
Northwestern Panama	5 ♀	49–53 (51.5)
Average	7 ♀	51.5

Tangara larvata larvata (DuBus)

Calliste larvata DuBus, Esquiss. orn., 1845, pl. 9 (Tabasco, s. e. Mexico).

Three males and a female were collected at Lancetilla 14 January to 2 March, and a female at Tela 28 March. The latter bird was breeding, and her complement of eggs was doubtless complete since she had a developed incubation patch, and the ovaries and oviduct were returning to normal size. This Tanager is a rather common species inhabiting low jungle and second growth, but was not found in the heavy forest.

Thraupis cana diaconus (Less.)

Tanagra (*Aglaia*) *diaconus* Lesson, Rev. zoöl., 1842, p. 175 (Realejo, Nicaragua).

Five examples, two males and three females, of the Blue Tanager were taken, all at Tela, between 21 February and 28 March.

This is a not uncommon bird in the region about Tela, frequenting especially the vicinity of towns, roadsides and pastures, particularly where there are scattered palm trees. Together with other species, this Tanager was found to frequent the wild fig when in fruit.

Thraupis abbas (Licht.)

Tanagra abbas Lichtenstein, Preiz.-Verz. Mex. vög., 1831, p. 2 (Mexico).

This species was first met with at Progreso 30 and 31 January, when two males and a female were taken at about the same spot, the borders of a bushy pasture. I did not see it again until 24 March when I found two in the possession of some boys at Tela, who had just shot them with an air rifle from a "feeding tree." I saved one of these birds, a male. When Bangs and I visited the tree two days later we collected two males and two females besides seeing others, and on 28 March the birds were still in evidence on the same tree. Except at these two stations near Progreso and Tela, this species was not found elsewhere in the region.

Ramphocelus passerinii Bonap.

Ramphocelus passerinii Bonaparte, Antologia, 1831, no. 130, p. 3 ("Mexico or Cuba." Guatemala substituted as type locality by Berlepsch. 1910).

Six males, four females, Lancetilla 15 January to 21 March.

The Scarlet-rumped Tanager is one of the most numerous as well as one of the most beautiful and conspicuous birds in the vicinity of Tela. It is primarily a bird of the moist lowland thickets, coming out into the open to feed, but quickly darting back again when disturbed. The scarlet rump and upper tail coverts of the male contrast sharply against the velvet black of the rest of the plumage and render the bird easily recognizable even at a considerable distance; the olive and buff females are less readily recognizable.

Specimens from the southern parts of the range of this species average very slightly smaller than those from the northern parts, but the amount is too slight to form the basis for a separation.

Phlogothraupis sanguinolenta sanguinolenta (Less.)

Tanagra (Tachyphonus) sanguinolentus Lesson, Cent. zoöl., 1830, p. 107, pl. 39 (Mexico).

A single female of the Crimson-collared Tanager was taken at Progreso 30 January. None was secured in the Lancetilla valley, although on 26 March I shot at one while it was feeding with other birds on a small wild fig at Tela, and a day or two later saw another in abandoned banana lands near Lancetilla.

Piranga rubra rubra Linn.

Fringilla rubra Linné, Syst. nat., ed. 10, **1**, 1758, p. 181 (Carolina).

The Summer Tanager is a rather common winter visitant in northern Honduras. Three adult males and one immature male were collected at Lancetilla 21 and 24 January, 20 and 26 February; an adult male at Progreso 31 January, and an immature male 5 km. west of Tela 21 February.

Habia rubica rubicoides (Lafr.)

Saltator rubicoides Lafresnaye, Rev. zoöl., 1844, p. 41 (Mexico. I designate Vera Cruz as type locality).

Three males, four females, Lancetilla, 300 to 1,800 feet, 17 January to 29 March.

This species was found to be an inhabitant of the heavy rain forest where it is a common bird; a pair always seems to form the nucleus for the mixed forest flocks so characteristic of such situations during January and February. In fact, it is the scolding chatter of this Tanager that often first draws attention to the presence of an otherwise silent host of small birds.

A rather curious anomaly is noticed in an adult male in full red plumage collected 20 March; this specimen is in process of acquiring three new rectrices, and two new secondaries, both on the left side. All the new feathers are coming in olive as in the female, and naturally raises the question as to whether this species and perhaps others of the genus have not a complete seasonal change of plumage like some of the Pirangas. I, myself, have never seen a bird in the wholly green plumage of the female that was sexed by its collector as "♂," though I have seen a good many sexed as "♀" that looked as though "immature ♂" would have been more nearly correct. It is not unusual to find birds with the female type of plumage predominating, but with a few scattered red feathers, and these seem to be generally regarded as the immature male. I hope that these few remarks will result in ornithologists who visit Central and South America taking particular care in the correct sexing and "ageing" of such representatives of this genus as they may collect.

My birds from Lancetilla are without a doubt referable to *H. r. rubricoides* and not to *H. r. confinis* (*Phoenicothraupis rubica confinis* Bangs, Proc. biol. soc. Wash., **18**, 1905, p. 156) from Yaruca, Honduras. It is rather difficult to explain the occurrence of such a distinct form as *confinis* on the southern side of the coastal mountains of Honduras not much over fifty miles to the eastward of Tela. The males, it is true, are close to *rubicoides* and hard to tell from Vera Cruz examples collected in late May, but the females are very different, about intermediate between *rubicoides* and *vinacea*. At present there is a gap in the range of *Habia rubica* in Central America. It is apparently unrecorded from anywhere in the interior of Honduras and no further east than Yaruca. It is not known from Nicaragua. Northwestern Costa Rica is inhabited by *H. alfaroana* (Ridgw.), a bird usually regarded as a distinct species, but to my mind obviously a representative form of *rubica*. However, Carriker (Ann. Carn. mus., **6**, 1910, p. 842) says that over a small part of its range it occurs together with "*P. rubica*" (= *H. r. vinacea*), so perhaps it is best to still regard it as a species, unless *r. vinacea* be elevated to specific rank. Then *alfaroana* would certainly be a race of *rubica*. *H. fuscicauda* (Cab.),

of the lowlands of eastern and southwestern Costa Rica and Panama south to Canal zone, I consider to be more nearly allied to *H. salvini* than to *rubica*.

Habia salvini discolor (Ridgw.)

Phoenicothraupis salvini discolor Ridgway, Proc. Wash. acad. sci., **3**, 1901, p. 150 (Rio Escondido, Nicaragua).

Five males, two females, Lancetilla 21 January to 20 March.

The two species of Habia here listed, while similar in habits, notes, and general appearance in the field, nevertheless, frequent quite different situations. The species here in question probably occupies the same niche in the low moist jungle and second growth in the valleys that *rubicoides* does in the heavy forest, though as a rule it is not found in mixed flocks with other species, partly no doubt because such flocks are not as characteristic of the jungle.

Just how to place these examples, as well as the series collected by Brown at Ceiba and Yaruca in 1902, is a puzzling one. They are certainly not *salvini salvini*, to which form Honduranian birds have hitherto been referred, but on the whole are best placed with *discolor*, a form of which I have not examined an adequate series.

ICTERIDAE

Gymnostinops montezuma (Less.)

Cacicus montezuma Lesson, Cent. zoöl., 1830, p. 33 pl. 7 (Mexico).

The Montezuma Oropendula is a common bird in the entire region about Tela; it is certainly by far the most striking and conspicuous. About Lancetilla these birds were constantly in evidence everywhere in the valley, often resorting to the abandoned banana plantings to feed on ripened fruit.

At the time of my arrival, the middle of January, there was a very marked morning flight into the valley, the birds appearing from the northward about six in the morning and returning again about four in the afternoon. This for a time led me to believe that there was no breeding colony in the valley. However, Bangs found an active colony about half a mile from the experiment station on 24 February.

Amblycercus holosericeus holosericeus (Licht.)

Sturnus holosericeus Lichtenstein, Preis.-Verz. Mex. vög., 1830, p. 1 (Mexico).

A male 8 February, a female 23 March, both at Lancetilla. This species was found in the Tela region only in the Lancetilla valley,

where it proved to be a retiring if not an uncommon bird. It was seen on only six or eight occasions, in each case frequenting dense tangles along the river or in the abandoned banana plantations.

In another paper (Proc. Boston soc. nat. hist., **38**, no. 10, 1928, p. 464) Mr. Kennard and I stated that we were unable to recognize Todd's *centralis* (Proc. biol. soc. Wash., **29**, 1916, p. 95, Rio Sicsola, Costa Rica) but did not go into details. The sole character on which the form was based was that in *centralis* the wing was slightly longer than the tail, while in typical *holosericeus* the reverse was believed to be the case. Unfortunately, Todd did not give the number of specimens examined. I have carefully measured a series of eighty-seven birds, covering the region from southern Mexico to Darien (except Nicaragua), and tabulated the results as follows:

	Wing < tail			*wing = tail*		*Wing > tail*		
	♂	♀	*sex?*	♂	♀ *sex?*	♂	♀	*sex?*
Vera Cruz	5	4						
Yucatan	1		1					
Quintana Roo	2	1						
British Honduras	1	1						
Guatemala		1						
Honduras	1	1						
Western and southwest Costa Rica	7	2		3		3	2	
Northwest Panama (Pacific slope)	3	3						
Southeast Costa Rica	2					2		
Northwest Panama (Caribbean slope)	2			1	1	1	2	2
Canal zone	13	3		4		1		
Darien						3	1	
Totals	37	16	1	8	1	9	6	2

A glance at the table shows that all the birds from Honduras northward do have the wing shorter than the tail as claimed by Todd, but that from Costa Rica southward to the Canal Zone the majority have the same character, when one would expect the reverse, and that it is not until reaching Darien that all have the wing exceeding the tail. Even in this case I feel that the material from there is too scant to form the basis for a definite statement.

It is also of interest to note that the five specimens from the Santa Marta region, recorded by Todd (Ann. Carn. mus., **16**, 1922, p. 478–479) as *Amblycercus holosericeus* subspecies, have the wing *shorter* than

the tail, and were not named because of "inability to find characters to distinguish them from true *holosericeus*."

I follow Chapman (Bull. A. M. N. H., **55**, 1926, p. 695–696) in regarding both *flavirostris* and *australis* as subspecies of *holosericeus*.

Psomocolax oryzivorus impacifus Peters

Psomocolax oryzivorus impacifus Peters, Proc. biol. soc. Wash., **42**, 1929, p. 123 (Pasa Nueva, Vera Cruz, Mexico).

Corvus mexicanus Less., Traité d'orn., 1831, p. 433 (*nec Corvus mexicanus* Gmel.).

A male, two females, Tela, 5 to 8 March.

Bangs and I first found Giant Cowbirds in association with Boat-tailed Grackles on the dump just west of Tela, where the specimens listed were taken. After that I saw single individuals in flight up or down the Lancetilla valley, and on 31 March saw several about the Oropendola nesting tree.

Icterus spurius (Linn.)

Oriolus spurius Linné, Syst. nat., ed. 12, **1**, 1866, p. 162 (Carolina).

Several specimens shot, only two preserved: a male, Progreso 30 January, a female, Lancetilla 20 February. Orchard Orioles are extremely abundant winter visitors to the northern coast of Honduras. As a rule they occur in large flocks, in which females and immature males predominate, though on one occasion I saw nearly twenty adult males together in bushes bordering the Toloa canal. The birds occurred most numerously in the long rows of "madre de cacao" planted as live fence posts. I was surprised to find them feeding in the crowns of a species of giant forest tree during the brief period in February that these trees bore a profusion of small yellow flowers.

At the Toloa canal, between the tenth and twelfth of March, Orchard Orioles banded together in very large flocks, performing short aerial evolutions, apparently preparing to migrate northward.

Icterus galbula (Linn.)

Coracias galbula Linné, Syst. nat., ed. 10, **1**, 1758, p. 108 ("America" = Virginia and Maryland *ex* Catesby).

The Baltimore Oriole is an uncommon winter visitor in the Tela region; no specimens were secured, though the bird was seen several times during March.

Icterus mesomelas mesomelas (Wagl.)

Psarocolius mesomelas Wagler, Isis, 1829, p. 755 (Mexico).

A male and a female were taken at Lancetilla 8 February and another pair 52 km. west of Tela 10 March. This Oriole was found most numerously in the great Toloa swamp district west of Tela, where it occurred chiefly on flowering shrubs, particularly a large pink mallow.

Icterus mesomelas is not recorded from Honduras east of Omoa; its southern subspecies, *salvini*, is the bird found as far north as the Escondido River in Nicaragua. The birds from the region about Tela, while showing a slight approach to *salvini* in the reduction of the white or yellowish outer edge of the inner secondaries, nevertheless are definitely referable to the typical race with which they agree in smaller size.

Icterus prothemelas (Strickl.)

Xanthomus prosthemelas Strickland in: — Jardine's Contr. orn., 1850, p. 120, pl. 62 (Guatemala).

Eight specimens, both sexes, Lancetilla and Tela, 14 January to 6 March.

Lesson's Oriole is a common resident in the Tela region, frequenting the more open situations, particularly pastures with scattered palms.

Ridgway (Birds of North and Middle America, pt. 2, 1902, p. 270, note) states that specimens of this bird from Honduras and Nicaragua have the black portion of the underparts more extended posteriorly, and Carriker mentions (Ann. Carn. mus., **6**, 1910, p. 830) a tendency towards the same feature in connection with birds from Panama and Costa Rica, but remarks that it is not constant. For me to confirm this character would require a better balanced series in comparable plumages from all parts of the bird's range than is at present available.

Dives dives (Licht.)

Icterus dives Lichtenstein, Preiz.-Verz. Mex. vög., 1830, p. 1 (Mexico).

This Icterid was met with from time to time in the Lancetilla valley, not regularly but straggling in occasionally. It was first noted 2 February, when I shot a female from a cocoanut palm growing at the edge of a banana plantation near the Lancetilla office; three days later two males were collected near the same spot, and three other individuals seen; a fourth example was secured by Bangs 2 March. After the mid-

dle of March two birds, presumably a pair, were seen on several occasions in a small *potrero* at Lancetilla.

The only previous record for Dives in Honduras is that of a specimen collected at Guaruma by Erich Wittkügel and recorded by Ridgway (Proc. U. S. nat. mus., **14**, 1891, p. 470). I have not been able to locate this locality on any map, but judging from the context of Ridgway's article, it would appear to be somewhere in western Honduras, probably the Chamelicon valley.

Cassidix mexicanus mexicanus (Gmel.)

Corvus mexicanus Gmelin, Syst. nat., 1788, p. 375 (Mexico, *ex* Hermandez).
Quiscalus macrourus Swainson, Anim. in Menag., 1838, p. 299 (Real del Monte, Hidalgo, Mexico).

Great-tailed Grackles were found entirely, or almost entirely, in the immediate vicinity of the seashore. On 16 January an adult male was seen near the office at Lancetilla and was collected, but no others appeared there subsequently. They were very numerous along the waterfront at Tela and about the grounds and buildings of the fruit company, less abundant about the outskirts of the town. When away from buildings they are shy and difficult of approach, but on the fruit company grounds they are very tame. On one occasion I observed an adult male bathing under the spray of a lawn sprinkler and drinking from a pool of water on the concrete porch of the main office building. In addition to the bird shot at Lancetilla, three males and three females were collected at Tela between 29 February and 8 March. They are exactly like specimens from the coast of Texas.

Psilorhinus mexicanus cyanogenys Sharpe

Psilorhinus cyanogenys Sharpe, Cat. birds Brit. mus., **3**, 1877, p. 140, pl. 9 ("Pearl Bay lagoon, Mosquito" = Pearl Cay lagoon, eastern Nicaragua).

The Central American Brown Jay is not uncommon in the region about Tela, but on the whole is more numerous in the drier scrubby portions of the Ulua valley, where I found it common at Progreso 30 January to 1 February, and 52 km. west of Tela 9–12 March. It is a bird of the second growth or where patches of low forest alternate with pastures or open lands; situations that are also the favorite haunts of the chachalaca.

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THE STATUS OF BOTHRIOCIDARIS

By Robert Tracy Jackson

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No. 13.— *The Status of Bothriocidaris*

By Robert Tracy Jackson

My friend Dr. Th. Mortensen, in a recent paper, has taken the position that the ancient Ordovician genus Bothriocidaris is not an echinoid but a cystoid. The student of fossil invertebrates rarely has students of recent forms enter his field, and it is gratifying that a leading authority on recent Echini should undertake the study of fossil forms. That fossil and recent should be studied together for their mutual elucidation is, I believe, of fundamental importance. The student of recent Echini, in undertaking the study of fossils, of course has to recognize that fossils may be imperfectly preserved and are subject to confusing displacements and distortions for which allowance has to be made. They cannot be studied quite like recent forms, where all of the parts are in place.

I have been in touch with Dr. Mortensen for many years by correspondence or by personal contact, and admire his skill and zeal as an investigator. Nevertheless we both feel that cordial relations should not prevent, or be affected, by the free discussion of differences of opinion.

A list of publications cited is given at the end of this paper. In the text they are ordinarily referred to by date of publication, but my Phylogeny of the Echini and studies of Arbacia are referred to so often, they are usually recorded as Phylogeny and Arbacia paper.

Dr. Mortensen in his great memoir on the Cidaroida (1928*a*, p. 40) expresses doubt whether variations such as Prof. Réne Koehler has described in his extensive memoir on variation in Echini,[1] and I have described in my Phylogeny and Arbacia paper, have any general bearing on morphology and phylogeny. I think that an important aspect of a study of variants is that they often do throw light on morphology, as indicated by cases made use of in this paper.

As stated, Dr. Mortensen considers it doubtful whether variations in Echini have a bearing on phylogeny. I have shown in Echini (1899, 1912, 1914, 1927) that *Arrested variants* have characters which are typical of less specialized species of the genus, or less specialized genera of the family. *Progressive variants* have characters which are typical of more specialized species in the genus. *Regressive* and *Parallel variants*

[1] 1924. Anomalies, irrégularités et déformations du test chez les échinides, Ann. inst. océanogr.; new ser., **1**, fasc. 5, p. 159–480, 32 pls.

have characters comparable to those typical of more or less remote allies. Such variants have been found in studies of ocular and genital plates, in the number of elements in a compound ambulacral plate, in the number of columns of ambulacral and interambulacral plates in an area, and in the structure of the perignathic girdle. It is felt that these variants have a direct bearing on phylogeny. *Aberrant variants* have characters which are quite abnormal and cannot be correlated with the typical characters in any associated forms, but which are of interest from other points of view. Variation is at the very foundation of evolution and as such deserves careful consideration. (See classification of variation, Phylogeny, p. 18–20; Arbacia paper, p. 440–441.)

Bothriocidaris from the Ordovician of Esthonia is known from three species, including some seven specimens. Previously this genus has been accepted without question as an echinoid by all who have had occasion to study it. Also on account of its age and simple structure, it has been considered a primitive echinoid.

In the work of Aldrovandus, "De Animalibus Insectis Libri Septum," published in Frankfort, 1618, a copy of which is in the library of the Museum of Comparative Zoölogy, a figure of a fossil echinoid is given on the plate facing page 137. I assumed (Phylogeny, p. 244) that this figure represented a Bothriocidaris. Dr. Mortensen (p. 94) thinks that I was mistaken. I believe he is quite right and I was wrong, though Aldrovandus' figures of his fossil, published in 1606 and 1618, reproduced by Mortensen (1913, figs. 1–2, p. 238–240), do certainly resemble Bothriocidaris, especially the figure published in 1618.

In 1895 and 1896 (p. 233–235) I correlated the structural characters of Bothriocidaris with those of young developing stages of later Echini, comparing them especially with the characters found in young Goniocidaris, as critically and exquisitely worked out by Lovén (1892). In the Phylogeny of the Echini a new species was described, *B. archaica*, figs. 1–2, which was based on a specimen in Berlin; this also was the original described by Jaekel in 1894. In the Phylogeny and later papers, with further evidence, is elaborated the structural relations of Bothriocidaris as a primitive radicle.[1] The fact that I have studied it long and carefully does not prove that my views are correct, but does indicate that the views expressed are not hasty conclusions, and I

[1] As Bothriocidaris is discussed in many places in the Phylogeny, the pages may be recorded as follows: p. 12, 34, 45, 52, 53; fig. 2, p. 54; p. 57, 58, 64, 69; fig. 22, p. 70; p. 79; fig. 40, p. 80; p. 87–89; p. 148, fig. 162; p. 171, 173, 201, 208–211, 238–244; pl. 1, figs. 1–9; pl. 8, fig. 1. The pages of my Arbacia paper in which Bothriocidaris is considered are: p. 451, 460, 468, 472, 474, 480, 517, 541, 558.

would set forth the reasons for still considering Bothriocidaris a primitive echinoid in answer to Dr. Mortensen's contrary conclusions.

Dr. Mortensen, in his British Echinoderms (1927), p. 255, says: "In the oldest known Echinoid (*Bothriocidaris*) the interambulacra have only a single series of plates, and a vestige of this arrangement is still found in the other Echinoids, in the first interambulacral plate always being single. . . ." Again Dr. Mortensen, in his Postlarval development of some Cidarids (1927*a*, p. 375), says: "It can hardly be doubted that the existence of an unpaired primary interambulacral plate at the peristomial border throughout the whole of the Echinoid-class, . . . is an inheritance from the Bothriocidaroid ancestor." This, of course, as seen in the young (my fig. 10), before the primordial interambulacral plate has been resorbed in development, as usually occurs in Regular Echini. Shortly after the publication of that paper he wrote me that he felt that Bothriocidaris could not be considered an echinoid. He verbally expressed the same view when we met in London, previous to his trip to Leningrad to study the material of Bothriocidaris there preserved.

Dr. Mortensen's paper is divided under three heads: I. Remarks on the structure of Bothriocidaris; II. Affinities of Bothriocidaris; III. The origin of the Echinoidea. The same order will be followed in the present paper.

I. Remarks on the Structure of Bothriocidaris

Dr. Mortensen says (p. 94) of the ambulacral plates of Bothriocidaris that the pores lie not quite vertically, but at an angle of 45° to the vertical. He notes, however, that there is some difference, and in the type specimen of *B. pahleni* Schmidt the pores lie nearly vertical. In Mortensen's fig. 1.1, p. 95, of *B. pahleni* the ambulacral pores are not actually shown, as is stated, but the perforate tubercles for attachment of spines are shown, as is not stated. According to my observations, in *B. archaica* Jackson, the pores are very nearly vertical in position (figs. 1, 2). High, hexagonal ambulacral plates with pores nearly superposed is the character of young Goniocidaris (Lovén, 1892; Phylogeny, p. 57, 58). The same feature of high, hexagonal ambulacral plates occurs, more or less developed, especially adorally, in many clypeastroids and spatangoids. In spatangoids also the ambulacral pores may be vertically superposed to a greater or less extent (Agassizia, Lovén, 1874, Plate 30; Urechinus *et al.*, A. Agassiz, 1904, Plate 73, fig. 1; Metalia, Phylogeny, p. 57).

Mortensen further notes (p. 94) that the ambulacral pores of Bothriocidaris "lie in a rather large, round groove, very unlike the pores of any true Echinoid." The surrounding groove is very like the groove of the larger ambulacral plates of *Pholidocidaris irregularis* Meek and Worthen (Phylogeny, Plate **74**, fig. 8; Plate **75**, fig. 4). It is also similar

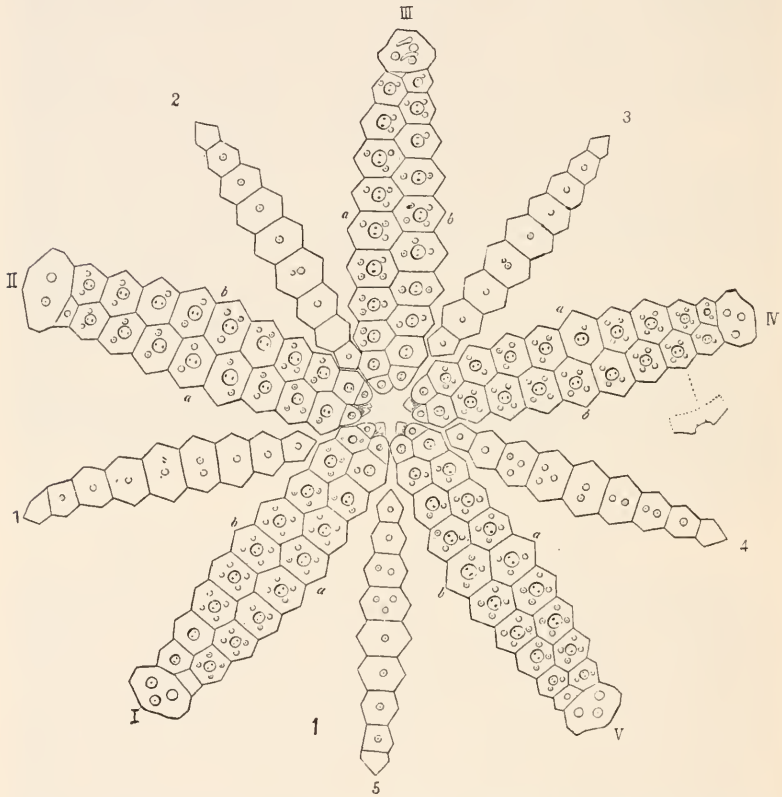


FIG. 1.— *Bothriocidaris archaica* Jackson. Ordovician, Island of Dago, Esthonia. × about 2.7. Two rows of peristomal plates; two columns of hexagonal plates in each ambulacrum and one column in each interambulacram. Orientation based on arrangement of primordial ambulacral plates. (After Jackson, 1912, pl. 1, fig. 1.)

to that of large ambulacral plates of Pholidocidaris that I have figured in a paper on the Palaeozoic Echini of Belgium (1929*a*, Plate **5**, figs. 6*a*, *b*; Plate **10**, fig. 3). The shape of the groove, or peripodium, of Bothriocidaris is certainly unusual for Echini, but one may allow for some differences in such an ancient type.

Mortensen's description (p. 95, fig. 2) of tube-feet in Bothriocidaris (confirming Lovén, 1883, p. 57) is most interesting. It certainly is very extraordinary that tube-feet, the only ones apparently recorded in a fossil echinoid, should exist in this ancient type. His figure cited is most interesting as showing also spines in place, associated with the perforate tubercles, which, making comparison with his fig. 1.1, are seen to lie in very close association with the peripodium.

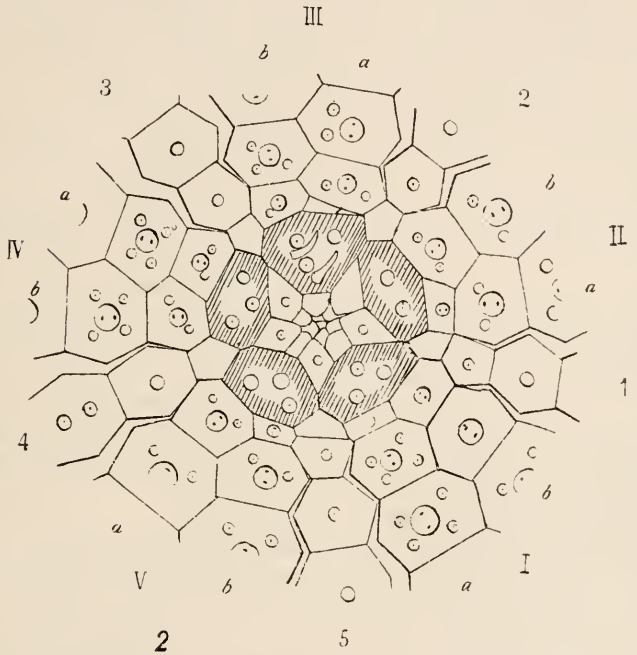


Fig. 2.—*Bothriocidaris archaica*. Same specimen as fig. 1. × about 5.1. Adapical portion of corona and apical disc. Oculars shaded, meet in continuous ring, genitals dorsal to oculars, small plates in periproct. (After Jackson, 1912, pl. 1, fig. 2.)

As regards the irregularities of some plates in the interambulacra of *Bothriocidaris pahleni* Schmidt and *P. globulus* Eichwald, that Mortensen describes (p. 96, 97, figs. 3.1–3), I have never seen such before, but it does not strike me as anything to be surprised at. The wedge-shaped, or extra plates added, might well be interpreted as a tendency toward two or more columns, which is the character of all other known Echini.

Mortensen (p. 97) speaks of interambulacral plates "divided into two." I know of no evidence for the origination of ambulacral or interambulacral plates in Echini by the division of a preëxistent plate. All coronal plates originate separately on the adoral borders of the oculars as far as known (Phylogeny, p. 28, 64, 362; Arbacia paper, p. 461, 491–492, 528, 541, 557).

The striking similarity of the interambulacrum of Bothriocidaris that Mortensen points out (p. 97) to Proteroblastus and Estonocystis (his figs. 3.4; 10.2-3)[1] may well be looked on as indicating parallelisms, not genetic affinity. The plates of Bothriocidaris bear typical echinoid tubercles and spines, which are quite wanting in cystoids.

Mortensen (p. 97, 98, fig. 4) confirms the view that has been held by some others that the madreporite of Bothriocidaris is in a radial [ocular] plate. This certainly is a remarkable fact, and it seems that it can only be accounted for as an irregularity of a primitive type. While this feature is different from that of typical modern Echini, it does not thus make an approach to any other known echinoderms. It may be observed that in variants of recent Echini I have described much irregularity as regards the position of madreporic pores in several genera, including three families. Madreporic pores of recent regular Echini are apparently always represented in genital 2, but in aberrant variants they may extend to other genitals, also to oculars and to the interambulacra. This demonstrates that madreporic pores are not necessarily limited to genital 2 where they typically occur and also demonstrates that madreporic pores may exist radially in an ocular plate (Phylogeny, p. 172, 173; Arbacia paper, p. 456).

Mortensen considers (p. 98–101)[2] that the plates lying between the oculars of Bothriocidaris cannot be genitals largely because "genital pores are decidedly absent." In such an ancient type it would be quite easy for small genital pores to be filled so as to be unrecognizable, or they may have existed and yet not be visible in external view. I cannot agree with Dr. Mortensen in his statement (p. 100; 1913) that "genital pores are well observable in external view in *Salenia Pattersoni*." I have just had the privilege of examining nine dried specimens of this species in the collections of the Museum of Comparative Zoölogy. In only two of these, which had specially cleaned tests, small genital and ocular pores were seen near the adoral borders of the plates. It seems it can be fairly said that the genital pores of *Salenia pattersoni*

[1] The advantage of the unusual system of numbering text-figures, instead of serial numbers, adopted by Mortensen here and in his Cidaroida memoir is not obvious.

[2] P. 99. *The reference* Jackson (op. cit., p. 39) *should read* (op. cit., p. 89).

A. Ag. are practically invisible externally in ordinary specimens of this rare deep-sea species. I stated earlier (Phylogeny, p. 112, 171, Plate **4**, figs. 1, 2) that ocular and genital pores are invisible on the exterior of *Salenia pattersoni*, though plainly seen on the interior. It is not strictly correct that they are invisible externally, but at that time I had only one specimen and then did not succeed in seeing the pores. Mr. Agassiz in the Blake Echini (1883), p. 14, says of *Salenia pattersoni:* "None of the genital pores, with the exception of the madreporic genital, are very distinct." In his Plate **4**, figs. 3, 15, 18, 23, the genital pores are shown in each of the five genital plates, but unfortunately, they are somewhat out of place, being too near the centre of the plates.

In the matter of visibility of pores it may be observed that the ocular pores in *Arbacia punctulata* (Lam.), *A. lixula* (Linn.) and *Tetrapygus niger* (Molina) are ordinarily quite impossible to see in exterior view (Arbacia paper, p. 454). To suggest, as Mortensen does (p. 101), that genital organs in Bothriocidaris may have occurred in connection with the tube-feet seems unwarranted.

In an earlier paper Dr. Mortensen (1912, fig. 1, p. 31) considered the plates adoral to the apical disc in Bothriocidaris as genitals. These same plates I considered adapical interambulacral plates (Phylogeny, p. 88). At that time Dr. Mortensen did not mention the absence of pores as any objection to his view of their genital character.

In his discussion of the lack of pores visible in genital plates of Bothriocidaris, Dr. Mortensen says (p. 101): "It is in this connection of importance that also the 'ocular' plates are devoid of an ocular pore." It is a rather remarkable fact that in the whole family of the Palaeechinidae, with several genera and many species, that there is not a case known in which ocular pores are visible on the exterior of ocular plates. In *Lovenechinus missouriensis* (Jackson) are described casts of ocular pores seen from the interior (Phylogeny, Plate **41**, fig. 2), and I have seen the same in internal moulds of Melonechinus, but apparently these pores did not reach the surface, or at least reach it so as to be visible in external view (Phylogeny, p. 89; Arbacia paper, p. 454). As ocular pores have not been seen on the exterior of the plates in this large family, where many species and specimens are known, it is not remarkable that ocular pores also are not known in the ancient Bothriocidaris.

Mortensen indicates (p. 100) that new interambulacral plates should originate at the adoral border of the genitals. I have shown (and Lambert has shown) over and over again that interambulacral plates in Echini originate on the adoral border of the oculars, and are quite

independent of the genitals (Phylogeny, p. 62; Arbacia paper, p. 461, 491–492, 528, 541). Definite demonstration that interambulacral plates originate below the oculars and are quite independent of the genitals is seen in ethmophract spatangoids in which typically genital 5 is absent, and yet the interambulacra are developed below the overlying oculars as usual, fig. 3. Again, in rare aberrant variations, where oculars are misplaced adorally from the apical disc, ambulacra and interambulacra extend adorally from the misplaced oculars just as they typically do from the apical disc (Phylogeny, Strongylocentrotus, text-fig. 1, p. 37; Toxopneustes, Plate 7, fig. 2). Still additional proof that interambulacral plates develop normally without any contact with

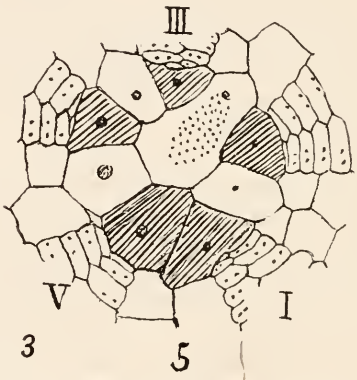


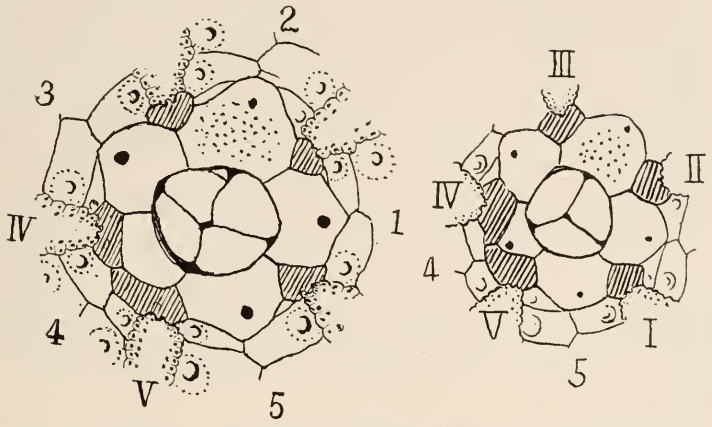
FIG. 3.— *Micraster coranguineum* (Lam.). Cretaceous, England. ×6.7. Oculars I, V meet and cover ambulacra I, V and interambulacrum 5. (After Jackson, 1912, fig. 174, p. 149.)

genitals is seen in rare regressive variants in which ocular plates meet on the adoral border of genitals so as to cut them off from contact with the corona as in figs. 4 and 5 (Arbacia paper,[1] figs. 24–29, p. 459–461). Or again, in aberrant variants, when a genital is wanting, in partially tetramerous Echini, and as a result, two oculars come in contact, figs. 6 and 7 (Arbacia paper, figs. 66–70, p. 539–540). Yet in all these cases interambulacra develop as usual.

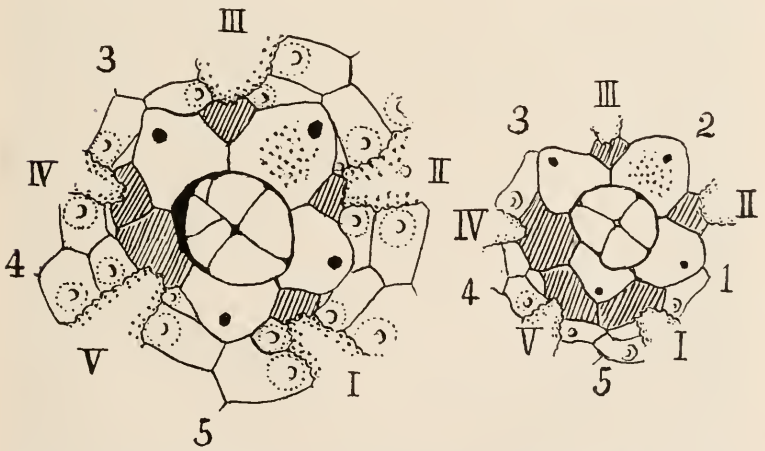
Later on in his paper, in considering the origin of the apical system,

[1] The character of oculars meeting below a genital is a feature of *Arbacia punctulata*, fifteen cases of this variation having been found in that species, an average of about one to a thousand. It has also been observed and figured by Koehler in *Arbacia lixula* (Linn.). In other Echini I have found only one similar case in over 50,000 specimens examined.

Dr. Mortensen says (p. 119): "that in Echinoids the genital plates always lie adapically to the ocular plates." One might feel that this



FIGS. 4–5. *Arbacia punctulata* (Lam.). Woods Hole, Mass. × 4. Variants.
FIG. 4.— Oculars V, IV meet and shut out genital 4 from corona; genital 4 imperforate.
FIG. 5.— Similar to fig. 4, but genital 4 perforate. (After Jackson, 1927, figs. 25, 26.)



FIGS. 6–7. *Arbacia punctulata* (Lam.). Woods Hole, Mass. × nearly 4. Variants.
FIG. 6.— Genital 4 wanting, oculars V, IV in contact and cover ambulacral V, IV and interambulacrum 4.
FIG. 7.— Genital 4 wanting, oculars I, V, IV in contact and cover entirely ambulacral I, V, IV and interambulacra 5 and 4. Genital 5 excluded from corona by adoral contact of oculars I, V. (After Jackson, 1927, figs. 66, 68.)

statement should be considered merely a slip of the pen, but the context would indicate that he intended it. It certainly is not correct, but it is in accord with his theory that oculars and ambulacra rise from below and meet the overlying genitals as a sort of cap-stones to the columns (see p. 506). In the great majority of Palaeozoic Echini, as in Melonechinus (Phylogeny, text-fig. 163, p. 149), ocular and genital plates form a continuous ring, adapically all lying in one plane. While in the young of all Recent Regular Echini, as far as known, genital plates lie dorsal to the oculars, in very many species, in development, one or more oculars enter the periproct, or become insert (see p. 499). By this movement adapically such insert oculars come in to the same plane dorsally as the genitals. When all oculars become insert, as in progressive variants, or as a typical specific character, then the oculars and genitals form a continuous ring in one plane on their adapical border, as in most Palaeozoic forms (*Cidaris affinis* Philippi, Centrechinus, Tripneustes, Dermatodiadema *et al.*, Phylogeny, text-figs. 59, 80, 95, 127).

Ocular plates are essential features in Echini. On the other hand genital plates are of secondary morphological importance as indicated by several factors. A genital plate may be typically absent, as in the posterior area 5 in spatangoids, fig. 3. Or a genital plate may be absent in aberrant variants, as seen in partially tetramerous Echini, my group 17 of nonpentamerous variants, figs. 6, 7 (Phylogeny, p. 45–46, 167; Arbacia paper, p. 538–541, figs. 66–70). Or again, an extra sixth genital plate may be added in aberrant variants, as seen in partially hexamerous Echini, my group 22 (Arbacia paper, p. 548–549, figs. 72, 73). In these several cases the test develops as usual, unaffected excepting by the absence of the wanting genital, or the presence of the superadded genital. Genital pores typically exist in a genital plate, either a single pore to a plate, or in cases, two or more pores may exist in a plate (most Palaeozoic Echini, also parallel variants of modern Echini, Phylogeny, p. 171; Arbacia paper, p. 458, fig. 21). On the other hand, genital pores may typically occur in the interambulacra in certain clypeastroids (Arbacia paper, p. 458). Or apparently in the Cretaceous Guettaria, according to Gauthier, genital pores in part may exist in ocular plates as a character (Arbacia paper, p. 458). In Recent Regular Echini I have recorded many cases in which, as parallel variants, genital pores exist in the interambulacra, or in ocular plates (Phylogeny, p. 170, text-fig. 198; Arbacia paper, p. 458, figs. 22, 23). It is evident therefore, that while genital pores usually occur in genital plates, they are not necessarily associated with that structural part. In young

Echini, at an early stage, genital pores have not yet appeared in genital plates (Lovén, 1874, Plate **21**; 1892). While in many, perhaps most species, genital pores appear early (in Strongylocentrotus at about 5 plus mm. diameter, Phylogeny, p. 131, text-figs. 131–134), I have shown that in the primitive genus Centrechinus genital pores do not appear until much later, when specimens are about 14 plus mm. in diameter (1914, p. 145, fig. 1). In adult Echini, as arrested variants, one genital, or two, or more, up to four genitals, as observed, may fail to have a genital pore (Arbacia paper, p. 456–457, figs. 9, 19, 20, 24). A genital plate, therefore, develops as usual, whether a pore is present or absent. The madreporic pores may be single, though usually many, and may be limited to genital 2, or may extend beyond that plate as considered, p. 486, 494, 499.

Mortensen suggests (p. 101, fig. 9): "that the whole apical system of *Bothriocidaris* is not really homologous with that of other Echinoids, but rather with the plates at the base of the Cystid calyx." In the cystid figure cited there are four plates in the centre, six in the surrounding row, and seven in the next row. The structure of this Protocrinites as figured by Mortensen differs essentially from that of the apical system of Bothriocidaris, fig. 2.

An important feature to consider in relation to the apical disc of Bothriocidaris is the point of introduction of new plates of the corona. In all Echini the young last added plates of both the ambulacra and interambulacra are added on the adoral border of the oculars, which is apparently the seat of the placogenous zone (Phylogeny, p. 86; Arbacia paper, p. 491–492). In *Bothriocidaris archaica*, the smallest, that is, the youngest ambulacral plates, lie on the adapical border of the area in immediate contact with the oculars (fig. 2). This same feature is shown in Mortensen's figures of *B. globulus* and *B. pahleni* (his fig. 4, p. 98; fig. 6.1, p. 99 and fig. 8.1, p. 100), also my fig. 8. This condition is exactly as it exists in all known Echini. As it is with the origin of ambulacral plates, so also it is with the origin of interambulacral plates. In *Bothriocidaris archaica* (fig. 2) the oculars form a continuous ring, excluding the genitals from contact with the interambulacra. Here the smallest, that is, the youngest interambulacral plates are in contact with the oculars only (fig. 2). This is just as the interambulacra are typically in contact with the oculars only in the posterior area in ethmophract spatangoids (fig. 3) in which oculars I and V meet and cover interambulacrum 5 completely (Phylogeny, text-figs. 174–175, p. 149). Also it is directly comparable to rare regressive variants of living Echini in which oculars meet on the adoral border of a genital,

figs. 4 and 5 (Arbacia paper, figs. 25–29, p. 459–460) and the interambulacra abut on the joined oculars. An interesting comparison of rare regressive variants in recent Echini with Bothriocidaris is where an interambulacrum in Arbacia drops out to a single column of plates adapically and the youngest last added interambulacral plate lies directly against the oculars only as in *Bothriocidaris archaica* (Phylogeny, compare Plate **4**, fig. 11; Plate **1**, fig. 2).

Instead of oculars meeting in a continuous ring, they may be separated by the genitals, more or less completely as in my fig. 8, after

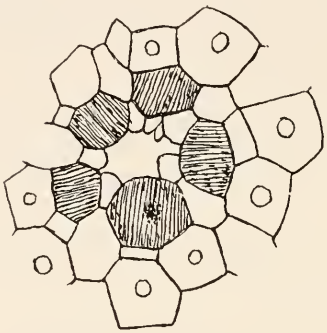


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Fig. 8.— *Bothriocidaris pahleni* Schmidt. × 6. Apical disc, oculars shaded, separated by intervening [genital] plates. (After Mortensen, 1928, fig. 8.1.)

Mortensen, of *Bothriocidaris pahleni*. This structure, with ocular and genital plates both reaching the corona, it is to be observed is practically the same as is typical of all other Regular Echini, excepting that the genitals are much smaller than usual (see p. 499) and that in Bothriocidaris there is only a single column of interambulacral plates. In this relation the smallest, that is, the youngest interambulacral plates of Bothriocidaris, are in contact with the oculars and an intermediate genital. An interesting comparison to this is seen in a rare regressive variant of Arbacia in which an interambulacrum has dropped out to a single column of plates adapically, and the last added plate lies against the oculars and intermediate genital (fig. 9). This last contact is practically identical with that shown by Mortensen (my fig. 8) in a camera sketch of *B. pahleni*. It seems that this definite correlation of the point of origin of new plates in the corona of Bothriocidaris as

compared with that of all known Echini is strongest evidence of immediate kinship.

The radial position of the supposed teeth of Bothriocidaris has been a real stumbling block. Dr. Mortensen's observations help this difficulty by seeming to show that they are not teeth at all. As he notes

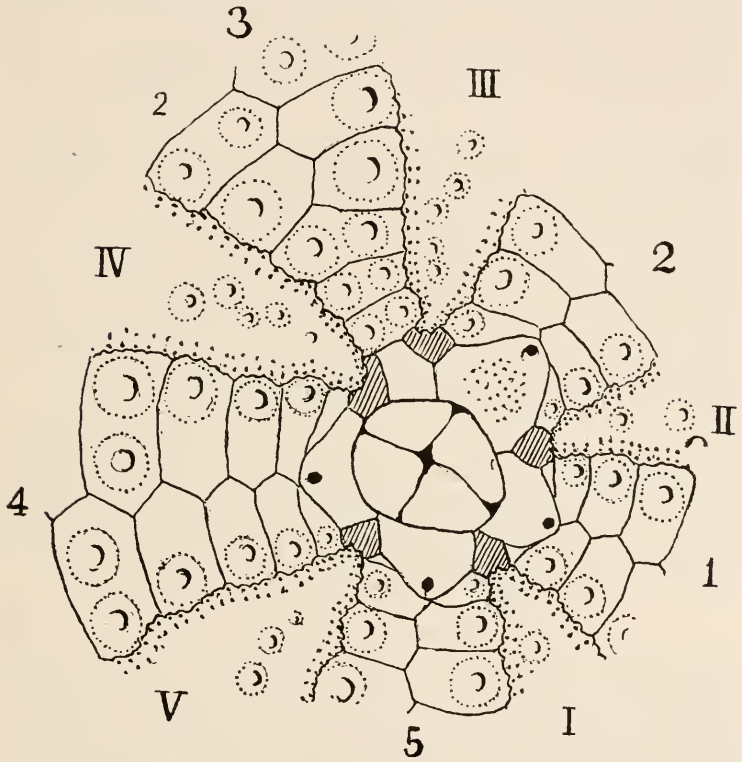

FIG. 9.— *Arbacia punctulata* (Lam.). Woods Hole, Mass. ×4. Variant. Interambulacrum 3 reduced to single column for last three plates built, genital 3 of peculiar shape and imperforate. Compare fig. 8. (After Jackson, 1927, fig. 40.)

(p. 102, 109): "There is an indication of tubercles on them, decidedly no striation." Again, in the examination of another specimen from the Reval Museum, Dr. Mortensen says of the "teeth" (p. 121), "It is perfectly evident in this specimen that these plates are of the same nature as the other coronal plates, absolutely not coming from the interior of the test." With all the evidence it seems that these supposed

"teeth" may fairly be considered nonambulacral (that is, bearing no pores) peristomal plates, which are abundant in many Echini (Phylogeny, text-fig. 57, p. 84). They certainly cannot be considered coronal plates as Mortensen implies. I am free to say that one would not expect to find nonambulacral plates adoral to the primordial ambulacral plates in Bothriocidaris, but, as they occur in some other Echini, there is no morphological reason why they should not be present.

The giving up of the supposed "teeth" from the evidence that Dr. Mortensen brings forth, does not mean that Bothriocidaris was necessarily edentulous, as he assumes (p. 109). It may well have had and probably did have a lantern as in all other Regular Echini, though not at present known. In the Lower Carboniferous genus Melonechinus, with 14 known species, the Aristotle's lantern is known in only one species, *M. multiporus* (Norwood and Owen), and there very rarely (Phylogeny, p. 379, Plate **56**, figs. 9–10). I recently examined no less than 45 specimens of *Lovenechinus lacazei* (Julien) from the Lower Carboniferous of Belgium, and not a trace of a lantern showed in a single specimen. Yet the lantern exists in several relatively nearly allied forms and doubtless did in the species mentioned.

Dr. Mortensen considers the teeth under the heading peristome (p. 101). To this I would take exception. The peristome is the tissue, plated more or less, or naked, that extends from the basicoronal plates to the mouth opening. The Aristotle's lantern with its associated muscles and the perignathic girdle, as far as existent, are structures quite separate from the peristome (Phylogeny, p. 79, 177).

II. The Affinities of Bothriocidaris

In referring to Thiéry's view of Bothriocidaris as the young of Palaeechinus, as quite untenable, to which I entirely agree, Mortensen (p. 104) indicates that the madreporite and teeth of Palaeechinus are interradial. In this he somewhat exceeded the known facts. Recognizable madreporites are rare in the Palaeozoic and have not been recorded in Palaeechinus, indeed I have not personally seen one in any of the family of the Palaeechinidae. I have thought it possible that some of the several extra pores in genital plates of Palaeozoic types where madreporites are not known, might have served as madreporic pores, as a single madreporic pore occurs in young Goniocidaris (Lovén, 1892, Plate **2**, fig. 7), also in adult Habrocidaris and Echinocyamus, and most Fibulariidae (Phylogeny, p. 172). As regards the lantern of Palaeechinus, while previously unknown in the genus, I very re-

cently described a lantern in *Palaeechinus ellipticus* M'Coy, from the Lower Carboniferous of Belgium (1929*a*, p. 37, Plate **2**, fig. 16). It is incomplete and not in place, but if it were in place the teeth would doubtless be interradial in position. Dr. Mortensen notes (p. 104) that the primordial interambulacral plate has disappeared in Palaeechinus. As I have shown, the primordial interambulacral plate has been resorbed not only in Palaeechinus, but also in the whole family of the Palaeechinidae (Phylogeny, p. 66; Arbacia paper, p. 472, 474; 1929*a*, p. 32–33, 36).

Dr. Mortensen says of Bothriocidaris (p. 105–106): "That the ambulacra are, in general, of Echinoid character is, of course, undeniable, above all on account of the placing of the radial water-vessel inside the test." The radial water canal is on the inner side of the ambulacral plates of Bothriocidaris as well as in all other Echini. On the other hand, the radial water canal is on the outer side of the ambulacral plates in all cystoids and other Pelmatozoa as far as known, and also in all Asterozoa. This internal as compared with an external position of this important structure is a most fundamental character in echinoderm morphology, and is a very strong argument for the echinoid character of Bothriocidaris.

Mortensen thinks (p. 107) that the fact that the adoral ambulacral plates on the peristome [the primordial ambulacral plates] of *Bothriocidaris archaica* Jackson are arranged in the sequence I*a*, II*a*, III*b*, IV*a*, V*b* large, and I*b*, II*b*, III*a*, IV*b*, V*a* small (fig. 1), following Lovén's law, as in the young of Regular (fig. 10) and young and adult of Irregular Echini "is a very weighty argument for the Echinoid nature of *Bothriocidaris*." Allowing this he says (p. 107): "But we do not know whether perhaps the same condition obtains in the protocrinite Cystids, in which case this argument would lose all its weight." This character is not known in any cystoids. If, however, it should be found, it might be evidence for connecting such a type with Echini, but would not, it appears, break its force in regard to Bothriocidaris. Bothriocidaris, as seen in *B. archaica*, is the only adult Regular Echinoid yet known that does show this character of primordial ambulacral plates.

Dr. Mortensen (p. 107) now seems to feel that the single primordial interambulacral plate at the peristomal border in Echini has little weight, though formerly (1913; 1927, p. 255; 1927*a*, p. 375) he accepted it as "an inheritance from the Bothriocidaroid ancestor." The existence of a primordial interambulacral plate on the peristomal border was first shown by Lovén in clypeastroids and spatangoids in his great work Études sur les Échinoidées. Döderlein (1887, p. 17, Plate **9**, fig. 6P)

was apparently the first to show the existence of the single primordial interambulacral plate in Regular Echini. His figure of a fragmentary *Goniocidaris canaliculata* A. Ag., 2 mm. in diameter, shows plates of the peristome, the single primordial interambulacral plate, and high ambulacral plates at this early stage. I regret to say that in previous publications I overlooked the discovery of these structures by Döderlein. Lovén (1892) showed the existence of the primordial interambulacral plate with other features in very complete specimens of very young Goniocidaris and Strongylocentrotus. Lovén's contributions to the knowledge of echinoid morphology and development in these and other structural features include, I think, the most fundamental additions to our knowledge of this subject that have been made. Mortensen in his publication on Postlarval Cidarids, and also in his Cidaroidea memoir, as I have earlier recorded (1929), seems to completely ignore, or give but scant recognition to Lovén's highly important work.

The single primordial interambulacral plate is retained in the adult in the basicoronal row in representatives of the Palaeozoic Lepidocentridae and Lepidesthidae (Jackson, 1896, 1912, 1927*a*; Bather, 1918), in the Triassic Tiarechinus (Lovén, 1883), in the Recent Echinothuridae and Arbaciidae (Arbacia paper, p. 468) and in most of the clypeastroids and spatangoids (Lovén, 1874). In most Regular Echini the primordial interambulacral plate, or the same with additional plates, are resorbed in development (Arbacia paper, p. 471–478).

From the primordial interambulacral plate passing adapically, excepting in Bothriocidaris,[1] there are typically two plates in the second row, marking the introduction of the second column of plates (fig. 10). This covers the condition in all modern Echini. In Palaeozoic Echini typically there are two plates in the second row, and three plates in the third row, and passing adapically, more columns may be added up to 14, found in *Hyattechinus pentagonus* Jackson, which is the largest number known. These columns, 2–14, are all added perfectly regularly in all types, barring slight individual variations, or mechanical displacements in preservation.[2] The columns, as added, mark successive stages in development of the interambulacral areas as I have shown abundantly in Palaeozoic Echini (1895, 1896, 1912, 1929*a*, fig. 5, Plate

[1] Also excepting the Triassic Tiarechinus, which, according to Lovén (1883) has a very peculiar structure, the primordial interambulacral plate in each area being succeeded by three narrow, high plates which fill the rest of the area.

[2] In the order Perischoechinoida there may be only three columns of plates in an interambulacral area, as in *Lepidesthes wortheni* Jackson and *Meekechinus elegans* Jackson, or species are known characterized by four, five, six, seven, eight, etc. columns in an area, up to fourteen, as noted above.

4, figs. 2, 3). The same developing structure of the interambulacrum is shown by Bather (1918, 1920) in *Pholidocidaris anceps* (Austin). This development of the interambulacrum as indicated by the progressive addition of columns is directly parallel and comparable to the development of the ambulacra, marked also by the addition of columns passing adapically in certain Palaeozoic types as seen especially in the Palaeechinidae (Phylogeny, p. 229–232).

Largely ignoring all that has been shown as regards the development of the interambulacrum in Palaeozoic and later types, Mortensen says (p. 107): "if the monoserial condition of the Echinoid interambulacra really were the primitive condition, distinct signs thereof would exist in the young stages of the skeletal development." I agree with him

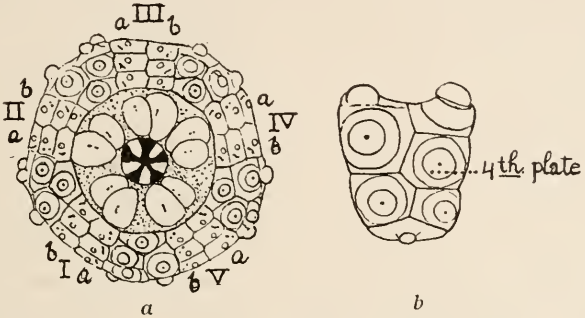

FIG. 10.— Young *Eucidaris metularia* (Lam.), Banda, East Indies. *a*. Primordial interambulacral plates in place, primordial ambulacra plates on peristome. *b*. An interambulacrum of same specimen, × 50. Lettering mine. (After Mortensen, 1927*a*, fig. 4, p. 372.)

entirely. They should show and, it appears, they have been shown to exist, first by Lovén and then by many other investigators, including Mortensen himself in his Postlarval Cidarid memoir (1927*a*). Referring to his Postlarval Cidarid paper (1927*a*), Mortensen says (p. 107): It was "a surprise to me . . . to find no trace of the original monoserial condition in the interambulacra of the young Cidarids." As in his paper cited he figured the primordial interambulacral plates in place, succeeded by two plates in the second row in *Eucidaris metularia* (his fig. 4*a*, p. 372, reproduced here as my fig. 10*a*), it is difficult to see how he can make this statement. This the more so because he says (p. 375): "It can hardly be doubted that the existence of an unpaired primary interambulacral plate at the peristomial border throughout the whole of the Echinoid-class, (though resorbed in the course of development in

most of the regular forms), is an inheritance from the Bothriocidaroid ancestor." Mortensen says now: "The only fact which might, perhaps, indicate an original monoserial condition is the slightly larger size of the fourth interambulacral plate" (1928, p. 107–108; Postlarval Cidarids, figs. 4*a*, *b*, p. 372, p. 375–376). Again he notes (p. 108): "This fact, however, may equally well be regarded as a reminiscence of an original pluriserial condition." I completely fail to see what this slight difference in size of the fourth interambulacral plate (my fig. 10*a*, *b*) has to do with either a former monoserial, or pluriserial condition. It could hardly be evidence, however, for both of two quite different structural conditions as Mortensen implies.

According to Mortensen (p. 108): "The existence of a single primordial interambulacral plate at the peristomial edge in Echinoids is . . . the main argument for seeing in *Bothriocidaris* the ancestor of the Echinoids." While it is truly an essential argument, there are other important features in which Bothriocidaris may be considered a primitive echinoid.

Mortensen suggests (p. 108; 1913) that the "existence of only a single primordial plate at the adoral end of the [inter] ambulacra is simply due to lack of space." There is no considerable increase of space in the zone where the second column is introduced (Phylogeny, Plate **2**, fig. 1; Plate **3**, figs. 9–11; Arbacia paper, figs. 37, 38*a*, p. 470; Lovén, 1883, Plate **15**, fig. 172; Gordon, 1926). Again, the space for the width of the primordial interambulacral plate is, at least frequently, as great, or even greater than the space for the width of the ambulacral area in the same zone. Yet in the ambulacral areas there are always two plates in the basicoronal row, with the exception of the Lower Carboniferous Melonechinus in which there are typically four plates in the basicoronal row (Phylogeny, p. 360, Plate **56**, figs. 3, 7).[1]

Mortensen also considers (p. 108) that as "the following plates are not paired, but alternating, it would naturally be expected that there should be only one, not two or more plates of [at] the adoral end of the interambulacra." It should be observed in this connection that the coronal ambulacral plates of Bothriocidaris, and typically in all other Echini also, are alternating, not paired.

In the Urechinidae and some of the Pourtalesiidae (Lovén, 1883, Plate **21**; A. Agassiz, 1904, p. 121–123, 148, text-figs. 159–164, 214; Phylogeny, text-fig. 27, p. 70) the single primordial interambulacral plate is succeeded by a second single plate before the introduction of

[1] In some genera of the Lepidesthidae, in which the structure is incompletely known, in the ambulacral areas there may also have been more than two plates in the basicoronal row.

the second column. Apparently the same character occurs in two species of the Lower Carboniferous Hyattechinus where two superposed single plates at the adoral border of each interambulacral area precede the introduction of the second column of plates (Phylogeny, Plate **24**, fig. 4; Plate **25**, fig. 1).[1]

Mortensen claims (p. 108): that "the characters of the apical system and the peristome very decidedly speak against regarding *Bothriocidaris* as an Echinoid." With this I distinctly disagree. He says the radial position of the madreporite "is entirely opposed to Echinoid morphology." While the radial position is certainly unlike what one finds in Echini, it does not by that means indicate connections with cystoids, or any other echinoderms that we know. We therefore do not get any help in regard to affinities from the radial position of the madreporite. If the interradial position of the madreporite is to be considered "fundamental in Echinoderms" (p. 108), it is "fundamental" with qualifications, for, as I have shown in aberrant variants in several genera of recent Echini, including three families, madreporic pores may extend beyond genital 2 and exist in other genitals, radially in oculars (see p. 486), and in Strongylocentrotus even in the interambulacra (Phylogeny, p. 172–173; Arbacia paper, p. 456).

It can be maintained that the apical system of Bothriocidaris in most respects is very definitely in accord with that of other Echini. In regard to the large oculars and very small genitals, both reaching the periproctal area, it should be observed that this same character exists as shown by Bury (1896, Plate **7**, fig. 34; Phylogeny, p. 87, 90, Plate **3**, fig. 5, and schematic fig. 7) in very young *Echinus microtuberculatus* Blainv. Very rapidly in Echinus, Bury's fig. 36, the genitals increase actually and proportionately in size and shut out the oculars from contact with the periproct. This feature of all oculars being exsert is the typical character of young Recent Regular Echini. From the condition of oculars all exsert, next in development, the oculars may separate the genitals and enter the periproct, or become insert, one or more to all, in definite sequence (Phylogeny, p. 147–153, Strongylocentrotus, figs. 131–139*a*, p. 129, 132; Centrechinus, figs. 88–95, p. 106–107; 1914; 1927, p. 443–453). When oculars are all insert in Recent

[1] In this figure of *Hyattechinus pentagonus* Jackson the adoral plates are shaded, without intent. In the text this character is not described. The same feature of two single adoral plates superposed is seen better in the new species *Hyattechinus elegans* Jackson from Belgium that shows developing characters very perfectly. At first I considered the adoral single plate as a non-ambulacral peristomal plate, but it seems that it may more reasonably be considered a small primordial interambulacral plate, succeeded by a second single plate in each area (Jackson, 1929*a*, p. 27–28, text-fig. 5, pl. 4, figs. 2, 3).

Echini we find, by reversion, or by a second taking on of the character, the condition which is typical of Bothriocidaris and most other Palaeozoic Echini (Lovénechinus, Melonechinus, Perischocidaris *et al.*) that all oculars and genitals meet the periproct in a continuous ring of plates. The relatively very small size of the genitals and large size of the oculars of Bothriocidaris is, apparently, a unique feature in an adult echinoid, but this appears to be a primitive condition for, as stated, it is comparable to very young Echinus. Usually in Echini the genitals are much larger than the oculars in Palaeozoic as well as in later types. In the Recent deep-sea genus Dermatodiadema (A. Agassiz, 1904, Plate **28**), however, the broadly insert oculars nearly equal or surpass the genitals in size.

The periproct of Bothriocidaris is more or less completely occupied by small plates, which bear tubercles, and are comparable to those seen in many other Echini. They are closely similar to the plates found in the periproct of young cidarids, as figured by Mortensen (1927*a*, fig. 5*b*, p. 373). Mortensen (p. 122) compares the periproctal plates of the Reval Museum specimen of *Bothriocidaris pahleni* with the periproctal plates of cidarids.

Mortensen says of Bothriocidaris (p. 108–109): "In the peristomial region the exclusion of the interambulacra from the peristomial border is a fact hard to reconcile with Echinoid morphology." It is not obvious what he means by this statement. As I understand the peristome, it is the tissue plated more or less, or naked, that extends from the base of the corona to the mouth opening and not including the lantern (Phylogeny, p. 79–86). In Bothriocidaris the peristome is plated with two rows of ambulacral plates, the primordial ambulacral plates and one additional row.[1] Next comes the base of the corona, with a single plate in each interambulacral area and two plates in each ambulacral area, forming the basicoronal row. This character of the peristome and the base of the corona of Bothriocidaris (fig. 1) is closely comparable to that of young Phormosoma. As Mr. Agassiz says (1904, p. 79, figs. 131, 132): "One cannot fail to be struck with the Bothriocidaroid structure of the actinal system of young Phormosa (Plate **43**, figs. 3, 5)." Again the peristome of Bothriocidaris is almost exactly comparable to that of the young of *Eucidaris metularia* (Lam.) as figured by Mortensen himself (1927*a*, fig. 5*a*, p. 373). The only structural difference from this last is that in the Eucidaris the two rows of ambulacral peristomal plates do not fill the area and the primordial interambulacral plates at

[1] To these should apparently be added the five adoral nonambulacral plates, previously considered "teeth," but which, according to Mortensen, should be considered plates.

that stage are largely resorbed. At a little earlier stage, however, Mortensen's figure 4*a* (my fig. 10*a*), the primordial interambulacral plates are fully in place. The peristome and base of the corona of Bothriocidaris again is like that of young Goniocidaris and Strongylocentrotus (Lovén, 1892), also Echinus (Gordon, 1926), excepting that in these cases there is only one row of ambulacral plates on the peristome, instead of two rows. The interambulacra of Bothriocidaris therefore extend to the basicoronal row on the peristomal border, as they do typically in the young and also in the adults of all Regular Echini in which the primordial interambulacral plates have not been lost by resorption and also as they do typically in the adults of most Irregular Echini.

In Bothriocidaris the demarcation between the coronal and peristomal plates in the ambulacra is not strongly marked (fig. 1) as it commonly is in recent Echini, but this line of demarcation is also not markedly shown in some other fossil types, as especially seen in the Palaeozoic Palaeodiscus, Hyattechinus, Lepidesthes (Phylogeny, Plate **18**, fig. 2; Plate **23**, fig. 1; Plate **68**, fig. 3). This character is particularly clearly seen in my new *Hyattechinus elegans* from Belgium (1929*a*, text-fig. 5, Plate **4**, figs. 2, 3).

Mortensen again (p. 109) brings up the "teeth" of Bothriocidaris and their radial position. I think he shows that they are not to be considered teeth and, as stated (p. 493), may tentatively be regarded as nonambulacral peristomal plates. The radial position of what have been called "teeth" is not in itself an argument for cystoid affinities. Also (as I stated earlier, 1929), as Mortensen maintains that the supposed "teeth" may properly be considered plates, one cannot argue, as he does, that the radial position of a nonexistent part (teeth) is evidence against the echinoid nature of Bothriocidaris.

Mortensen says (p. 109): "The necessary conclusion from these various fact[s] is then that *Bothriocidaris* cannot be regarded as the ancestor of the rest of the Echinoids; in fact, it cannot be considered as an Echinoid at all." He emphasizes this statement by widely spaced type. This is certainly putting it pretty strongly.

Mortensen expresses the opinion (p. 109) that Bothriocidaris is nearly related to diploporite cystoids (his figs. 10.1–3, p. 110). In these cystoids the interambulacra do certainly resemble those of Bothriocidaris, but one may consider this as parallelism because of the weighty differences. These cystoids have brachioles, diplopores, an external water canal, unlike all Echini, and nothing apparently corresponding to the tube-feet, ambulacral pores, peristome, apical disc, or tubercles and spines of Bothriocidaris and all other Echini.

Dr. Mortensen treats as if assured, the changes necessary to alter a diploporite cystoid into Bothriocidaris. As he says (p. 111): "No doubt, we cannot simply unite *Bothriocidaris* with the Diploporite Cystids; there are too many important differences for that. These latter may well partly have been called forth by the assuming of a free-living existence by *Bothriocidaris* instead of the stalked condition of the Cystids. The free-living existence necessitated means of moving about; for this the fingers of the Cystids would not do, and they were replaced by the large tubefeet known with certainty to have existed in *Bothriocidaris*. In connection herewith the ambulacral furrow of the Cystids disappeared from the surface, the radial canal being placed to the inside of the ambulacral plates, as in Echinoids." This statement Dr. Mortensen makes as if it had taken place, without any qualification as to its being a suggestion, a theoretical conception, or even allowing of any alternative. It seems that this view is quite unwarranted by the facts and based on pure speculation.

III. The Origin of the Echinoidea

Dr. Mortensen (p. 112) is quite willing to accept parallel evolution for Bothriocidaris as compared with Echini. Why may it not be equally possible to consider the similarity of the interambulacral characters of certain cystoids to Bothriocidaris as cases of parallelism?

Mortensen (p. 113) accepts the view that the progressive additions of columns of plates in the ambulacra of certain Palaeozoic Echini (Palaeechinidae), passing from the adoral border adapically, represent specialized development; but will not allow the same for the adjacent interambulacra. Both ambulacra and interambulacra, as regards the additions of new plates, are built alike, the new plates in both areas being added on the adoral borders of the oculars, and by this addition the earlier built plates are thereby progressively pushed adorally. It seems reasonable to argue that as the two areas grow alike, therefore the multiplication of columns, representing stages in development, should be read alike in both, passing from the peristomal border adapically as I have shown in numerous cases (1895; 1896; 1912, p. 62–69, 226–232; 1929*a*, p. 28, 32).

Mortensen says (p. 113): "For answering the question, where to seek the ancestor of the Echinoids, it is essential to make clear which must be regarded as the more primitive type of interambulacra, that with one or few, regular series of plates, or that with many plates not arranged in definite series." Mortensen argues in favor of irregular,

pluriserial plates as the more primitive (1913), as he considers (p. 113) Echinocystis and Palaeodiscus are "the oldest of all known Echinoids." This, of course, on his assumption that Bothriocidaris is not an Echinoid. Both Echinocystis and Palaeodiscus which Mortensen considers as having pluriserial, irregular plates occur in the upper part of the Silurian, the Lower Ludlow shales of Leintwardine, England. Mortensen perhaps overlooked the fact that I described *Koninckocidaris silurica* Jackson, from the Niagara Limestone of New York State, which is about Middle Silurian and is distinctly older than the Lower Ludlow (see Kayser, Lake, 1893, Comparative Geology, p. 74). *Koninckocidaris silurica* has eight columns of plates in an interambulacrum and they are prefectly definitely arranged in regular columns (Phylogeny, p. 285–286; Plate **19**, fig. 1; Plate **20**, figs. 5, 6).

Mortensen says (p. 113): "It may well be said to be a general principle in morphology that the primitive condition is the existence of many plates, their gradual reduction in number and the corresponding specialization of the remaining parts being the sign of higher development." In support of this view he refers to the foot of the horse, but this seems rather far from the Echini. The horse, however, even in the adult retains structural evidence of former polydactylism, but Echini neither in young nor adult, show any evidence of a former pluriserial condition. In Foraminifera, ammonoid cephalopods, trilobites and many plants, ontogenesis and phylogenesis are both marked by the progressive addition of structural parts, or structural complexity. Mortensen's view of the reduction of parts as "a general principle" is directly contradicted by the development of the disc in ophiurans, in which the early stages and primitive forms have 11 or 21 plates. To these others are added progressively in development until the complicated disc coverings of the more specialized forms are attained.

Mortensen states (p. 114) of Palaeodiscus and Echinocystis that the plates "are not arranged in regular columns, as is the condition in the later palaeozoic forms [also in the earlier *Koninckocidaris silurica*], is also what might be expected, as the quite *irregular arrangement must evidently* [italics mine] be more primitive than the arrangement in regular columns." What is the evidence for this? To paraphrase his words of p. 107. If the pluriserial, irregular "condition of the Echinoid interambulacra really were the primitive condition, distinct signs thereof would exist in the young stages of the skeletal development." I agree with this absolutely, but so far no evidence from development has been adduced in proof of an original pluriserial ancestor, rather all evidence from development, in both fossil and recent Echini, is in favor

of a monoserial ancestor. Against the evidence from development, Mortensen assumes (p. 113; 1913) "there can be no doubt that the many interambulacral plates represent the more primitive condition." Again he assumes (p. 114) that the "irregular arrangement must evidently be more primitive than the arrangement in regular columns." With these two assumptions as a basis, he looks for an ancestor of the echinoids.

Hawkins, who is an experienced palaeontologist and a keen student of Echini, recently published (1927), with his student, Miss S. M. Hampton, a critical memoir on Echinocystis and Palaeodiscus. Of both genera they say (1927, p. 582, 588) that the interambulacra are "built of regular columns," though, as the plates are very thin and imbricating, and distortion has ensued from crushing, considerable overlapping and displacement has taken place. According to Hawkins and Miss Hampton, in Echinocystis there are four columns of ambulacral plates adorally with alternate primary and occluded plates adapically (1927, fig. 3, p. 586). Echinocystis is certainly specialized, not primitive. The critical opinion of Hawkins and Miss Hampton, based on prolonged study, does not uphold Mortensen's view that Echinocystis and Palaeodiscus are primitive Echini with pluriserial, irregular plates.

Mortensen gives a highly theoretical discussion (p. 114–117) of how one could derive a primitive echinoid with pluriserial interambulacra from Stromatocystis (fig. 12, p. 115) by developing a lantern, changing the position of the anus, madreporite, ambulacra, and developing genital plates, all of which seems very easy to him and far from clear to me.

Mortensen thinks (p. 117): "that the Echinoid ambulacral plates really do correspond to the Asteroid adambulacral plates," though definite proof is wanting. He suggests (p. 117) that: "It is tempting to see the homologues of the true ambulacral plates in the inner prolongations from the ambulacral plates which are found in several Cidarids," and also "in the palaeozoic *Hyattechinus*." The prolongations from the ambulacral plates of cidarids, as described in both *Eucidaris tribuloides* (Lam.) and *Phyllacanthus baculosa* (Lam.) (Phylogeny, p. 61, Plate 3, figs. 12, 13) are direct spinose projections from the interior of the ambulacral plates. There is no evidence of sutures to indicate that they could be considered as separate parts, such as Mortensen's suggestion calls for. In the cidarids described there may be one, or several of these projections to an individual plate and they extend adapically for a considerable distance, even to or above the mid-zone. In the Lower Carboniferous *Hyattechinus beecheri* Jackson and *H. rarispinus*

(Hall), both from Pennsylvania (Phylogeny, Plate **24**, figs. 5, 6; Plate **26**; Plate **23**, figs. 2, 7), I described similar spinose projections extending into the interior of the test from the adoral ambulacral plates. Again I have described similar spinose projections in a new species, *Hyattechinus elegans* Jackson, from Belgium (1929*a*, p. 29; Plate **4**, fig. 4*g*). Still again I have found similar spinose projections in the ventral plates of an undescribed species of Hyattechinus from the Pilton Beds of Devon, in the British Museum, no. E 12,262 (1929*a*, p. 29). In the case of Hyattechinus in the several species there is only a single spine on the interior of each adoral ambulacral plate, situated near the perradial suture. These internal spinose projections are apparently trivial structures, with no obvious function, and it is hard to conceive that they have any considerable morphological bearing.

Dr. Mortensen now seems rather suddenly to have changed his view as regards the morphological relations of the spinose projections on the interior of the ambulacral plates of cidarids. In his superb work on the Cidaroida recently published (1928*a*, p. 35), considering the apophyses of the perignathic girdle of cidarids, which are direct upgrowths from the basicoronal interambulacral plates, without referring to his previous view he says: "Small apophyses also, as a rule, proceed from the inside of the ambulacral plates, all of them or only those at the peristomial edge (Fig. 22); they would appear to be *homologous with the auricles of other Echinoids* [italics mine], though none of the lantern muscles are attached to them." The internal spinose projections in cidarids (to which he refers as apophyses) being direct outgrowths from the ambulacral plates have no sutural connection, whereas auricles do have sutural connection. As shown by Lovén (1892) in his remarkable studies of the lantern and associated parts, auricles are separate parts joined by suture with the interior of the basicoronal ambulacral plates of the Centrechinoida. On the auricles are inserted radially (in the Centrechinoida) the retractor muscles of the lantern, whereas in adult Cidaroida these retractor muscles are inserted interradially on the apophyses (Phylogeny, text-figs. 222, 225–230, p. 193; 1929).[1]

As shown by Lovén, in his unique study of young Goniocidaris (1892), at an early stage, apophyses have not yet appeared, and lantern muscles are inserted directly on the basicoronal primordial interambulacral plate. This structure is very important in relation to Palaeo-

[1] Following Lovén, I worked out the structure of the Aristotle's lantern with its muscles and the perignathic girdle in some additional types and introduced the term *apophyses* for the interambulacral processes of the perignathic girdle (Phylogeny, p. 177–198, pl. 2, figs. 7–17, 19–21; pl. 4, figs. 3–5, 8–10; pl. 5, figs. 1–12; pls. 12, 27 *et al.*; 1914, p. 146, 155; 1927, p. 484; 1929*a*).

zoic types, in which, apparently, no perignathic girdle was developed, and by inference lantern muscles were also inserted directly on the basicoronal interambulacral plates (Phylogeny, text-fig. 221, p. 190–193; 1929; 1929*a*, p. 10).

Regarding Mortensen's view (p. 117) that ambulacra started from the ventral side "to which they were originally confined" and extended "over the aboral side, unto the top," all the evidence we have from the addition and growth of plates of Bothriocidaris and all other echinoids is that ambulacral plates originate beneath the ocular and from there are pushed down by the adapical intercalation of later added plates (Phylogeny, p. 52).

Dr. Mortensen (p. 118) assumes the existence of diplopores, and then assumes that they disappear, which to his mind accounts for their absence in Bothriocidaris. The movement about of the madreporite and the periproct seems to Dr. Mortensen (p. 118) to be easy to understand. To me, it is not.

In brief, Dr. Mortensen's main points against the echinoid character of Bothriocidaris are: (1) that the madreporic pores are in a radial plate; this deserves careful consideration; (2) that what have been considered genitals have no visible pores and therefore in his opinion cannot be accepted as genitals; (3) that what have been considered "teeth" are radial in position (he disposes of this by showing that apparently they are not teeth but plates); (4) finally, he is firmly convinced that the primitive ancestor of the echinoids must have had pluriserial, irregular interambulacral plates; this in direct opposition to what is known from stages in development in both fossil and living forms, and again in opposition to expert opinion in regard to the structure of ancient fossil Echini.

In his appendix (p. 122), in describing a new specimen of *Bothriocidaris pahleni* Schmidt, from the Reval Museum, Mortensen indicates that in only one area does an interambulacrum meet an intervening plate [genital] of the oculars. On the other hand, in his fig. 8.1, p. 100, recorded as the same species, and here reproduced as my fig. 8, all the interambulacra meet such an intervening plate. As he says (p. 122): "The fact that interambulacra of *B. Pahleni* are thus now insert, now exsert, is almost definite proof that the species *Bothriocidaris archaica* Jackson, differing from *B. globulus* only in its interambulacra being all exsert, cannot be maintained but is to be regarded only as a synonym of *B. globulus*."

I originally applied the terms *insert* and *exsert* in descriptions of ocular plates to indicate meeting, or shut out from contact with the

periproct (Phylogeny, p. 90). The term may also be applied to genitals which usually meet, but as aberrant variations, sometimes, though rarely, are shut out from contact with the periproct. I have found 67 cases in which a genital plate (usually genital 3, occasionally 4, very rarely some other genital) was exsert, or shut out from contact with the periproct. Such exsert genitals average about one in 5,000 plates observed (Phylogeny, text-figs. 177–184, p. 165; Arbacia paper, figs. 30–33, p. 461–463). Dr. Mortensen's use of the terms *insert* and *exsert* is unfortunate. In his application interambulacra *insert* means that the interambulacra come in contact with genitals, and interambulacra *exsert* means that interambulacra come in contact with oculars only. In neither case do the interambulacra have any relations with the periproct, a condition which the terms were originally intended to describe.

Bothriocidaris archaica (figs. 1, 2) agrees with *B. globulus* in having tubercles on both ambulacral and interambulacral plates. In this respect both species differ from *B. pahleni* which has tubercles on the ambulacral plates only. In *B. archaica* the oculars meet adorally in a continuous ring, whereas in *B. globulus* the oculars are all separated by the genitals, which thereby meet the interambulacra. Another difference, one that is brought out by Dr. Mortensen's studies, is the fact that in *B. globulus* (also in *B. pahleni*) in the interambulacra there are some wedge-shaped and also accessory plates (his figs. 3.1–3, p. 96), whereas in *B. archaica* the interambulacra consist of a continuous series of single plates without wedge-shaped, or accessory plates (fig. 1).

When describing the species *B. archaica*, it was felt that the continuous ring of ocular plates which shut out the genitals from contact with the interambulacra (fig. 2) is a remarkable character. It is the only known sea-urchin that does have this character in completeness, and I think it is desirable to maintain it as a species on this basis.

To sum up the characters and relations of Bothriocidaris as a type, passing from the mouth adapically.

1. Lantern unknown in Bothriocidaris, but probably one existed, as in all other Regular Echini (p. 494).

2. What in Bothriocidaris have been considered "teeth" in a radial position is an anomaly, unlike any known Echini, or any other known echinoderm. From Dr. Mortensen's studies they appear to be plates and may tentatively be considered peristomal plates (p. 493).

3. The ten primordial ambulacral plates (in *B. archaica*) arranged in the order I*a*, II*a*, III*b*, IV*a*, V*b* large, and I*b*, II*b*, III*a*, IV*b*, V*a* small

(fig. 1). The same sequence, as originally worked out by Lovén (1874, 1892), exists in the young of Regular Echini (fig. 10) and in the young and adults of Irregular Echini. Nothing comparable known in any other Echinodermata (p. 495).

4. Two rows of ambulacral plates on the peristome of Bothriocidaris (fig. 1),[1] directly comparable to the young of Eucidaris (Mortensen, 1927*a*, fig. 5*a*, p. 373) and the young of Phormosa (Phylogeny, text-fig. 41, p. 80 (p. 500).

5. In the basicoronal row of the corona of Bothriocidaris (fig. 1) two plates in each ambulacral area, one plate in each interambulacral area as is typical of the young of all Echini (fig. 10), or typical of the young and also the adult of many groups (Lepidocentridae,[2] at least some genera of the Lepidesthidae,[2] the Echinothuridae,[3] Arbaciidae,[3] and most of the Exocycloida[4]) (p. 498, 500).

6. Radial water canal within the ambulacral plates of Bothriocidaris, as in all Echini. The radial water canal is on the outer side of the ambulacral plates in the Pelmatozoa, as far as known, and also in the Asterozoa (p. 495).

7. Ambulacra of Bothriocidaris with two columns of high, hexagonal plates, pores at a high angle, or more or less nearly superposed (fig. 1). Like the young of Goniocidaris (Lovén, 1892, Plate **2**, fig. 8). The high character of plates like the young of Regular Echini (Döderlein, 1887; Lovén, 1892; Gordon, 1926; Mortensen, 1927*a*) and, at least adorally, like the young and adult of many Irregular Echini. High, hexagonal ambulacral plates exist throughout the area in some types, as in the fossil and recent spatangoid Cystechinus (p. 483).

8. Young ambulacral plates of Bothriocidaris lie on the adoral border of the oculars (fig. 2) as in all Echini (p. 491).

9. Interambulacrum with a single column of plates (*B. archaica*, fig. 1), or with some tendency to additional plates (*B. globulus*, *B. pahleni*, Mortensen, 1928, figs. 3.1–3, p. 96). This character is represented by a single plate, as in fig. 10 (exceptionally by two single plates superposed), at the adoral border of the corona in the young, or in the young and adult of all known Echini (Phylogeny, p. 170) (p. 496).

The character of an interambulacrum with a single column of plates, or the same with accessory plates, as a parallelism, is seen in some

[1] Also apparently the five adoral nonambulacral plates which have previously been considered teeth.

[2] As known in representative genera, Jackson, 1896; 1912; 1927, p. 468; 1929*a*, text-fig. 5, p. 25; pl. 4, figs. 2, 3; Bather, 1918.

[3] Jackson, Arbacia paper, p. 468, 475.

[4] Lovén, 1874.

diploporite cystoids (Estonocystis, Proteroblastus, Mortensen, 1928, figs. 10.2–3, p. 110) (p. 486).

10. Young interambulacral plates of Bothriocidaris lie on the adoral border of two oculars and an intermediate genital, when the latter separates the oculars (*B. pahleni*, fig. 8, after Mortensen), as is the typical condition in Regular Echini. The similarity is emphasized when as a very rare regressive variant in recent Echini an interambulacrum drops out to a single column of plates adapically, as seen in fig. 9 (p. 492).

Or young interambulacral plates may lie on the adoral border of two contiguous oculars only, when the latter are confluent, meeting below the genitals (*B. archaica*, fig. 2). This is similar to the condition in rare regressive variants of recent Echini in which in part oculars are also confluent on the adoral border of genitals (figs. 4, 5, 7). It is also comparable to the condition in the posterior area in ethmophract spatangoids, in which, as a typical character, genital 5 is wanting and interambulacrum 5 abuts on oculars only (fig. 3). Again the similarity is strongly marked when in very rare regressive variants an interambulacrum drops out to a single column of plates adapically and the last added plate lies against the two confluent oculars only (Phylogeny, Plate **4**, fig. 11) (p. 491).

11. Test of Bothriocidaris with tubercles, articulated spines and tube-feet as in all Echini, and as is unknown in Pelmatozoa (p. 485).

12. Oculars large, genitals very small (fig. 2), as in the very young of *Echinus microtuberculatus* (Bury, 1896, fig. 34) (p. 499).

13. Oculars of Bothriocidaris large, separated by the genitals, as in fig. 8 (also *B. globulus*), as usual in Echini, or oculars adorally meeting more or less completely in a continuous ring and thus excluding the genitals from contact with the interambulacra (*B. archaica*, fig. 2). This last is comparable to the condition in rare regressive variants of modern Echini in which oculars, in part, also meet on the adoral border of the genitals, as in figs. 4, 5, 7 (Arbacia paper, figs. 25–29, p. 459–461) (p. 491–492).

Oculars of Bothriocidaris in contact with the adapical limits of ambulacra and interambulacra as in all Echini (p. 492).

14. Genital plates small, separating oculars completely (*B. globulus*), or more or less completely (*B. pahleni*, fig. 8), or genitals dorsal to the oculars when latter are confluent (*B. archaica*, fig. 2). No madreporic or genital pores known in genital plates, which has cast some doubt on the character of these plates (p. 486, 492).

15. Madreporic pores of Bothriocidaris apparently in a radial

(ocular) plate (III in *B. archaica*). A radial position is not typical of any other Echini, or any other Echinoderm. In aberrant variants of recent Echini madreporic pores, however, besides being in genital 2, may extend to other genitals and radially to oculars (Phylogeny, p. 172, 173; Arbacia papers, p. 456) (p. 486, 499).

16. Oculars and genitals of Bothriocidaris form a continuous ring of plates, all adapically in contact with the periproct. This character is as usual in the Palaeozoic Echini and also in those later Regular Echini in which all oculars are insert. When genitals separate the oculars the adoral contact with coronal plates is the same as is typical of all Regular Echini (p. 499).

When oculars of Bothriocidaris meet on the adoral border of the genitals (fig. 2), the contact with the corona is similar to that seen in rare regressive variants of Recent Echini in which in part oculars also meet on the adoral border of genitals as in figs. 4, 5, 7 (Arbacia paper, figs. 25–29, p. 459–460). It is also comparable to the condition seen in the posterior area in ethmophract spatangoids (fig. 3) in which, due to the absence of genital 5, oculars I and V meet and cover completely interambulacrum 5 as well as ambulacra I and V (p. 491).

17. Periproct of Bothriocidaris composed of small plates, comparable to those of young Eucidaris (Mortensen, 1927*a*, fig. 5*b*, p. 373), and is typically Echinoid (p. 500).

18. All the evidence is that Bothriocidaris was free throughout life, as are all other Echini. On the other hand, the evidence is that all cystoids, as well as all other Pelmatozoa, were attached in the adult, or, if free in the adult, were at least attached in the young.

Hawkins (1929), after a detailed consideration of Mortensen's paper,, closes with the statement: "... I, for one, await some evidence that *Bothriocidaris* is unworthy to be called an Echinoid, or at least a forerunner of the class. Until that evidence is forthcoming (and I cannot find it in Dr. Mortensen's memoir), *Bothriocidaris* remains for me a representative of the primitive Echinoid type, from which all of the latter [later] forms I know could have been derived, and toward which many of them show, in the decline of their powers, a tendency to return."

For some thirty-four years I have regarded Bothriocidaris as a primitive echinoid and structurally representing a near approximation to what one may reasonably consider as an ancestral radicle of the group. I have presented much structural evidence, based on fossil and living, young and adult Echini in favor of this view. Bothriocidaris is the

central figure on which I based my classification of the Echini (1896, table facing p. 242; Phylogeny, p. 209), and from this echinoid I have drawn many conclusions in regard to the comparative morphology of the group. Maintaining these views, I felt called upon to present the evidence for my conclusions as opposed to that set forth by Dr. Mortensen. This I have done, and trust that the facts and conclusions have been presented with fairness to both sides. In addition it is hoped that differences of opinion and criticisms of Dr. Mortensen's views may be accepted by him and others interested in the spirit of seeking for the truth.

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SOME NEW PARASITIC NEMATODES FROM YUCATAN (MEXICO), INCLUDING A NEW GENUS OF STRONGYLE FROM CATTLE

BY J. H. SANDGROUND

WITH TWO PLATES.

CAMBRIDGE, MASS., U. S. A.:

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No. 14.— *Some New Parasitic Nematodes from Yucatan (Mexico), Including a New Genus of Strongyle from Cattle*

By J. H. Sandground

The parasites described in this paper represent part of a collection secured during the months of February, March and April, 1929, when the writer acted as parasitologist to the Yucatan Medical Expedition under the leadership of Dr. George Cheever Shattuck of the Department of Tropical Medicine, Harvard Medical School. The primary purpose of this expedition, which was financed in part by the Carnegie Institution of Washington, was to make a preliminary medical and sanitary survey of the indigenous Maya Indians and other population groups in the rural areas of Yucatan. The Carnegie Archaeological Station at Chichen Itza was used as a laboratory base for these investigations.

In addition to investigating the parasitic fauna of man in this locality (the report on which will be published elsewhere) advantage was taken of the opportunities that incidentally presented themselves for making helminthological examinations of various domestic animals slaughtered for food purposes, as well as of other animals that could be secured.

In this paper, several new nematodes are described. Of these, two possess such unique features as to necessitate the erection of new genera for their taxonomic disposition. In general, parasitization by helminths in this region was found to be low except in a few birds. Only a very few birds were found infested with trematodes, cestodes and acanthocephalans, and as yet the study of these forms has not proceeded to the point where their identity has been established.

STRONGYLOIDEA

STRONGYLIDAE

Bosicola gen. nov.

Generic diagnosis.— ? Strongylinae: body robust and cylindrical, attenuated at the extremities. The cephalic cuticle is dilated to form an annular hood around the oral orifice; posterior to this in the cervical region two additional cuticular collars are present. Two stout lateral papillae, or so-called amphids, present; median-dorsal and ventral papillae acicular, projecting slightly beyond the cuticular rim of the

circular mouth opening. Only a single leaf crown composed of small peglike elements. Buccal capsule infundibular and unarmed at its base. Esophagus cylindrical, slightly dilated at its base. Excretory pore at about the level of the anterior third of esophagus. Cervical papillae present. Bursa copulatrix slightly broader than long with a distinctly marked dorsal lobe. Ventral rays equal and parallel. Externo-lateral arises from a common trunk with the medio- and postero-lateral rays. Dorsal ray cleft; spicules long, slender and equal. Female tail tapers gradually to an acute point. Vulva near the anus. Oviparous.

Type species.— *Bosicola tricollaris*, spec. nov.

Bosicola tricollaris spec. nov.

Specific diagnosis.— *Bosicola:* cuticle white, with very fine transverse striations and also with inconspicuous longitudinal linear markings. The two stout lateral papillae are easily seen projecting as acicular filaments beyond the oral margin; two less conspicuous but broader papillae occur in the median-dorsal and median-ventral positions at the edge of the oral opening. The single corona radiata consisting of between 32 and 36 minute peglike elements lining the edge of the buccal aperture. Mouth circular in outline, and directed straight forwards. Buccal capsule, with cuticularized walls of medium thickness, funnel or cone shaped, and devoid of teeth or homologous cuticularized armature. It measures 40 μ in diameter at its outer edge and is about 55 μ in length. There are three distinct inflations of the cuticle in the cephalic region: the first, about 140 μ broad and 40 μ long, forms a hood or cap around the oral aperture; the second, about 120 μ broad and 160 μ long, whose anterior margin is inserted under the posterior margin of the second, and which is slightly smaller than the second, forms, together with the third cuticular inflation, two collars surrounding the cervical region.

The excretory tube opens ventrally by a conspicuous pore just under the posterior collar. A narrow annular band of nerve fibres, about 0.2 mm. from the anterior extremity, sends innervations to the small and slender cervical papillae, which may be discerned in favorable specimens in the lateral lines near the posterior border of the third cuticular inflation. The esophagus is a wide tube with a narrow lumen lined with cuticle. It measures about one-twentieth of the total length of the body in both sexes and is only slightly dilated in its posterior quarter. The intestine is rectilinear and a short narrow rectal region is differentiated posteriorly.

Male.— Length about 12.4 mm.; greatest breadth 0.37 mm. The spicules are striated transversely, slender, and each about 0.67 mm. in length. They have a slight expansion of the head, and they are in apposition for the posterior two thirds of their length. Gubernaculum absent. Genital cone more or less quadrate in shape. The bursa, about 0.4 mm. broad by 0.25 mm. long, is composed of two large lateral lobes united dorsally by a smaller median lobe. The externo-dorsal ray arises near the middle of the dorsal ray which subsequently bifurcates to form two pairs of digitiform processes, one short and thin, and the other larger and extending to the margin of the bursa. Lateral rays about equal in width and parallel. Externo-lateral ray more distinctly separated than postero- and median-lateral rays. Ventral rays parallel, and take their origin near the base of the trunk. Pre-bursal rays not observed.

Female.— Length about 14.2 mm.; greatest width 0.4 mm. Posterior extremity gradually attenuated behind the vulva to an acute point. The rectal portion of the intestine, 0.12 mm. long, opens at the anus situated in a slight depression of the general contour, 0.36 mm. from the caudal extremity. The vulva has salient lips and is situated about 0.25 mm. anteriad of the anus. Vagina about 0.14 mm. in length. In specimens in which eggs are not present in the terminal portion of the genital passage, the vagina lies almost at right angles to the axis of the body. It opens into two muscular pyriform ovejectors, in continuity with which are two forward-running uteri. The eggs are thin-shelled and elliptical in outline. They measure 74 to 82 μ by 40 μ and are discharged from the body in the early stages of segmentation.

Host.— *Bos taurus.*

Location.— Small intestine, especially ileum.

Locality.— Yucatan, Mexico.

Type specimen (♂) in glycerin, Cat. no. 41N, Helminthological Collection, Museum of Comparative Zoölogy. Paratypes of both sexes catalogued under same number. Paratypes also in U. S. Nat. Mus., Helminthological Collection, No. 8080.

Numerous specimens of the above-described parasite were found in one of three steers examined. Its pathogenic significance is not known, but since the parasites were found either only lightly attached to the walls of the intestine or free in the mucous contents of the bowel in which lesions were not apparent, it is probably of little pathological importance.

The parasite is very distinctly different from any member of the Strongylidae previously described. Since the helminths of domesti-

cated animals are now fairly well known for most regions of the world, it may well be that the form with which we are here dealing is of local occurrence, and is one which has become adapted to cattle, its original host being represented in the autochthonous fauna of the country, possibly the native deer.

Despite the extensive knowledge which has now accumulated on the structure of the multiplicity of forms incorporated in the important family, the Strongylidae, it not infrequently happens that difficulties are experienced in the allocation of the new genera that are described in the scheme of classification originally suggested by Railliet and Henry, and now so generally adopted. When the plan adopted for the systematic arrangement of allied forms falls short, it must necessarily also fail in the supplementary purpose of classification — to express genetic relationships. The artificiality of the present classification of the Strongylidae is gradually becoming evident, and a revision of the taxonomy of the group based on other considerations than those now in use or the emendation of definitions of groups as at present recognized seems to be called for. It is desirable, however, to postpone such an undertaking, until a still larger number of forms that do not easily fit themselves into the present system of classification have been described.

The parasite described in this paper, and for which the name *Bosicola tricollaris* is proposed, is a typical member of the Strongylidae whose subfamily affinities are obscure, for it cannot be accommodated in any of the four constituent subfamily groups, as these are at present delimited. On the basis of the important structures of the buccal capsule and cephalic region and in the disposition of the taxonomically significant characters in the reproductive organs in both sexes, it presents affinities with the members of the Oesophagostominae Railliet, 1915. It differs, however, from members grouped in this subfamily in that an external corona radiata is absent and in that, instead of having a single cuticular inflation limited ventrally by a cervical groove, the process of cuticular vesical formation in the cephalic region has proceeded to the point of development of three separate inflations or collars. On the basis of the structure of the buccal capsule, *Bosicola* shows greatest resemblance to those members of the Strongylinae which do not possess chitinous teeth or similar armature, but differs even in this connection from any genus of the Strongylinae as yet described.

METASTRONGYLIDAE

Cheiropteronema gen. nov.

Generic diagnosis.— Strongyloidea: long filiform nematodes with finely striated cuticle. Buccal cavity very shallow and without an obvious cuticularized capsule. Esophagus without posterior swelling. Bursa copulatrix narrow, consisting of two lateral lobes and supported by well-developed rays of reduced number. Female unknown. Parasites of the alimentary tract.

Type species.— *C. globocephala* spec. nov.

Cheiropteronema globocephala spec. nov.

Specific diagnosis.— *Cheiropteronema:* male 19.4 mm. long and 0.4 mm. broad near the middle. Body filiform, tapering towards both extremities. The anterior end is bluntly rounded and carries a hemispherical dome of cuticle. Near its apex, two lateral papillae appear slightly elevated above the cuticular surface. The oral aperture, as far as can be seen from a lateral view, is not guarded by salient lips (fig. 6). There is a very fine transverse striation of the cuticle and in addition it is marked by numerous fine longitudinal lines producing a checkered effect. Cervical papillae were not found. Buccal cavity either much reduced or absent, the mouth seeming to give entrance directly into the esophagus. The esophagus is straight and of practically uniform diameter. Its length is 0.42 mm. A delicate tube which probably represents the terminal portion of the excretory system opens on the ventral surface of the body, 60 μ behind the end of the esophagus.

Male.— Body abruptly truncated posteriorly to end in an acutely pointed tail (fig. 7). Two lateral lobes of cuticle arise from the sides of the body to form a caudal bursa which is open on the dorsal surface. These lobes are supported by six short stumpy rays as figured. Dorsal ray undivided and slender. Postero-lateral ray widely separated from median- and externo-laterals which are joined. Ventro-ventral and latero-ventral rays equal and parallel. There is a prominent genital cone projecting into the bursa. Spicules equal; 0.36 mm. long with slight swellings near their middle where the spicules measure 11 μ in width. A slender accessory piece or gubernaculum, 35 μ long, is present.

Female.— Unknown.

Host.— *Artibeus jamaicensis.*

Location.— Large intestine.

Locality.— Yucatan.

Type specimen.— Cat. no. 47 N, Helminthological Collection, Museum of Comparative Zoölogy, Cambridge, Mass.

The parasite described above is represented by a single male specimen found in the large intestine of the common neotropical "leaf-nosed" bat at Chichen Itza. Systematically, the reduced character of the bursa copulatrix and the atypical supporting rays thereof bespeak the affinities of Cheiropteronema with the Metastrongylidae. The fact that previously reported metastrongyles are recorded exclusively from the lungs and vascular systems, whereas the present material was taken very definitely from the intestine, need not be considered in making a taxonomic disposition of the organism on a purely morphological basis, although the several unique structures, such as the cephalic dome, may perhaps warrant its allocation in a new subfamily of the Metastrongylidae when, with more material available, the female is studied.

SPIRURIDAE

Spirurinae

Cyrnea Seurat, 1914

Cyrnea piayae spec. nov.

Specific characters.— *Cyrnea:* length of male 8.5 mm., greatest breadth 0.35 mm. Length of female 16.4 mm., greatest breadth 0.56 mm. Cuticle finely striated transversely and in addition is marked throughout its length by secondary rugae. Head with four well-defined lips bearing four conspicuous papillae. Buccal cavity cylindrical, 57 μ long and 16 μ in diameter. Esophagus about one third of body length— 2.88 mm. in a male specimen. Nerve ring encircles esophagus in its anterior part, 0.22 mm. behind the mouth. Cervical papillae very inconspicuous, on level with nerve ring.

Female.— Tail obtusely rounded. Anus 0.16 mm. from caudal extremity. Vulva only slightly salient, 1.92 mm. from posterior end. Vestibule or vagina 0.24 mm. long, at right angles to the long axis of the body. Uteri parallel and spacious. Egg elliptical, with relatively thin shell, 36 μ by 21.6 μ in size.

Male.— Posterior end straight. Caudal alae spread out, and marked with a mosaic design. There are nine pairs of caudal papillae having a distribution as shown in figure 8. Three preanal pairs are large and have short peduncles; postanally there are an additional three pairs of large papillae adorning the caudal wings and three pairs of smaller

sessile papillae arranged in linear series along the internal border of the wings. The spicules are unequal, measuring respectively 0.58 mm. and 1.22 mm. A gubernaculum, not well chitinized and of small dimensions, is also present.

Host.— *Piaya cayana thermophila.*

Location.— Duodenum.

Locality.— Chichen Itza, Yucatan.

Type material.— Cat. no. 38 N, Helminthological Collection, Museum of Comparative Zoölogy, Cambridge, Mass.

The parasite described above, of which only a single pair representing the male and female were available for study, is relegated to a new species of the genus Cyrnea. The name *C. piayae,* which carries reference to the host, is proposed. It may readily be distinguished from the six species, which, acording to the recent valuable monograph of Cram (U. S. nat. mus., 1927, bull. 140, p. 167), have been described in this genus, on the basis of the character of the caudal papillae, and also by the fact that its eggs are substantially smaller than those of other species.

Hadjelia Seurat, 1916

Hadjelia coragypis spec. nov.

Specific characters.— *Hadjelia:* length of male 6.15 mm., greatest breadth 0.26 mm. Length of female from 13.5 to 16.2 mm., greatest breadth (in region of vulva) 0.4 mm. The body tapers gradually at both extremities. Cuticle finely striated transversely. Head distinctly set off from the rest of the body by an annular constriction of the cuticle. Mouth typically limited by two lateral trilobed lips. Cylindrical buccal capsule 65 to 73 μ long and 18 μ wide. Esophagus, which is divided into glandular and muscular portions, is 2.72 mm. long in a female specimen of 15 mm. length. Cervical papillae very minute and situated at the level of the nerve commissure, 0.5 mm. from the anterior extremity. The excretory system, as seen in the living worms, comprises a bulbous vesical opening by a short tube about 70 μ behind the nerve ring.

Female.— Fairly straight. Anus situated 90 μ from the obtusely rounded posterior extremity. The vulva is situated slightly posterior to the middle of the body, 8.2 mm. from the anterior end. Uteri prominent and contain countless, relatively thick-shelled, elliptical eggs, 36–39 μ by 21–23 μ in size and embryonated when discharged. Anus 120 μ from posterior extremity of body.

Male.— On preserving in formalin or hot alcohol, the tail of the male assumes a tight spiral coil that makes taxonomic study difficult but which may be avoided if the specimens be permitted to die slowly in tap water before fixing. The caudal extremity is illustrated in figure 9. The caudal alae are narrow; that of the left side is shorter than its fellow of the right. The six pairs of alar papillae, of which four pairs are pre-anal and two pairs post-anal, are small and have such short pedicels that they at first appear to be sessile. A small median papilla is to be seen on the anterior rim of the cloaca and a second small papilla may be noted mesially near the extremity of the tail. The ventral surface of the body in the caudal region is ornamented with slightly raised cuticular ridges running longitudinally. The cloacal aperture is situated about 250 μ from the extremity of the tail. Spicules unequal, the left measuring 1.23 mm. by 12 μ broad, and the right about 0.45 mm. and 14 μ broad.

Host.— *Coragyps urubu.*

Location.— Under lining of the gizzard.

Locality.— Chichen Itza, Yucatan.

Type material.— Cat. no. 40 N, Helminthological Collection, Museum of Comparative Zoölogy, Cambridge, Mass.

The parasite described above corresponds in the most significant characteristics with the genus Hadjelia Seurat, 1916, of which all the four species previously recorded have come from the eastern hemisphere. On the morphological side the parasite may be readily distinguished from previously described species by the fact that in the female the vulva is situated near the middle of the body and not, as in others, anterior to the end of the esophagus. The diagnostic characters of the genus should consequently be emended to embrace this difference in the position of the vulva. Other differential characters of this species, for which we propose the name *Hadjelia coragypis*, lie in the size of the spicules and the dimensions of the eggs.

The parasite occurred in all five specimens of the common black buzzard, *Coragyps* (= *Catharista*) *urubu*, examined at Chichen Itza. They live in the submucous coats of the gizzard where, by their tunneling activities, extensive bacterial infection followed by tissue necrosis and sloughing of the mucosa occurs. As many as sixteen of these large worms were extracted from the gizzard of one bird but no acute inflammatory reaction appeared to be occasioned by their presence, an example of remarkable protective adaptation on the part of the host to the activities of what would seem to be a very insidious parasite that actually subsists on blood extracted from the blood vessels.

It is also of interest to note that the adult sex ratio of the species is markedly unequal, only three males as compared with forty females being found after a meticulous search of the entire lining of the gizzards in five birds.

OXYUROIDEA

OXYURIDAE

Syphaciinae

Alæuris Thapar 1925

Alæuris hirsutus spec. nov.

Specific diagnosis.— Fairly robust worms, with a thin white transparent cuticle marked with fine transverse striations about 5μ apart. The entire surface of the body is covered with wavy filaments. These do not appear to be normal outgrowths of the cuticle; they are more likely the attached hyphae of a fungus from which none of the very numerous specimens taken are free. (Compare Thapar's description of *Veversia tuberculata,* Jour. helminthology, 1925, **3**, p. 115.) Cervical or lateral cuticular alae absent. Mouth surrounded by three deeply lobed lips, each bearing two small papillae set closely together on its inner anterior face. Buccal cavity shallow, followed by an abbreviated pharyngeal region armed with a minute cuticularized spine. The esophagus is relatively narrow and long, being 56 μ wide and a third of the total length of the body in a male 6.0 mm. long, and slightly more than a quarter of the body length in a female 8.7 mm. long. Posteriorly it is enlarged into a fusiform bulb 145 mm. wide, containing a hinged valvular apparatus. The junction of the esophageal bulb and the region of the chyle intestine is guarded by a second controlling valve. The position of the excretory pore and nerve ring cannot be determined in the preserved material.

Female.— Length from 8.0 to 9.3 mm.; maximum width about 0.65 mm. Body tapers gradually to form a conical tail about 0.25 mm. long. Vulva non-salient; situated just behind the middle of the body. Oviparous. Eggs measure 135 μ by 72 μ. They are asymmetrically flattened on one side and have fairly thick shells.

Male.— Length from 6.0 to 6.4 mm.; width 0.56 mm. at the widest point. Posteriorly the body is abruptly truncated and is provided with wide caudal alae laterally. The tail terminates as a bluntly rounded appendage, bearing a pair of short pedunculated papillae terminally (fig. 10, *p. 4*). The cloaca is situated between two paired eminences of

the body. The ventral anterior pair bear each a pair of papillae. A third pair of papillae are borne on the post-cloacal eminence. Whether these eminences are analogous with papilla-bearing peduncles would be a matter of individual interpretation. They are, however, substantially larger than the peduncles of papillae usually encountered among oxyuroids. There is a single spicule, long and acicular. At its proximal end the head is dilated to form a knob; distally the spicule is sharply pointed. In different specimens the length of the spicule varies between 1.22 and 1.45 mm. In individuals not too well cleared in glycerin the thickening of the ventral wall of the cloaca (gubernaculum) is clearly to be seen. It measures 40 μ in length. In the fully cleared male individual the gubernaculum cannot be differentiated from contiguous structures.

Host.— *Iguana rhinolopha.*

Location.— Large intestine.

Locality.— Yucatan.

Type material.— Cat. no. 63 N, Helminthological Collection, Museum of Comparative Zoölogy, Cambridge, Mass.

The characteristics of the worm described here are in full accord with the definition of Thapar's genus Alæurus, except that lateral alae do not appear to be present and differences exist in the character and disposition of the caudal papillae in the male. Since the study of these structures is by no means a simple task in the complex of structures surrounding the cloacal region, the differences cannot be stressed to the point of being considered as holding generic value, but with good comparative material available of the related genera *Thelandros* and *Tachygonetria* further examinations for other significant differences between these genera might well be undertaken to substantiate their standing as different genera. Thapar has described two species of Alæurus, one from *Testudo ibera* and the other from *Iguana tuberculata.* Our specimens from *Iguana rhinolopha*, for which the name *A. hirsutus* is proposed, may readily be distinguished from both of these on the basis of their larger size, the much longer spicule, the fact that in the male the tail does not extend beyond the border of the caudal alae, as well as on the other considerations mentioned above.

EXPLANATION OF PLATES

All figures drawn with the aid of camera lucida. Magnifications indicated by accompanying scales.

Abbreviations: an. anus; b. cav. buccal cavity; c.a. caudal ala; cerv. pap. cervical papillae; d. dorsal ray; ex. d. externo-dorsal ray; ex. l. externo-lateral ray; ex. p. excretory pore; g. c. genital cone; gub. gubernaculum; l. p. lateral papillae; l. v. latero-ventral ray; m. l. medio-lateral ray; o. c. oral cavity; ov. ovary; ovej. ovejector; p. l. postero-lateral ray; ut. uterus; va. vagina; vu. vulva; v. v. ventro-ventral ray.

PLATE 1

PLATE 1

Bosicola tricollaris

Fig. 1. Anterior end showing buccal capsule.
Fig. 2. Anterior end showing esophagus.
Fig. 3. Posterior end of female showing reproductive organs.
Fig. 4. Posterior end of male showing spicules and bursa.
Fig. 5. Dorsal ray of bursa greatly magnified.

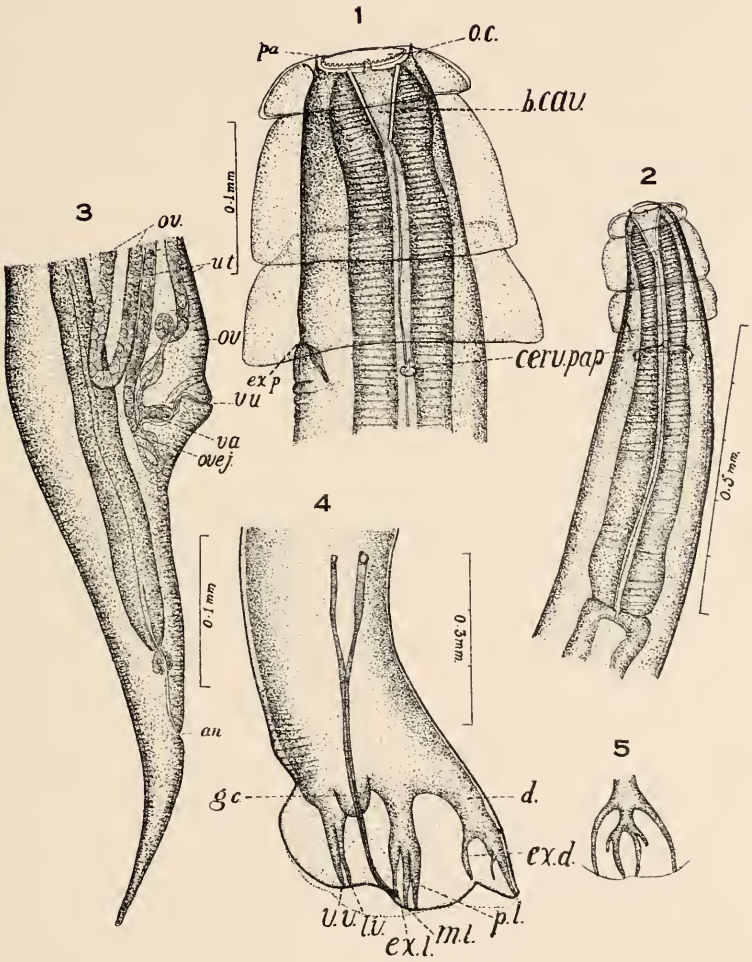
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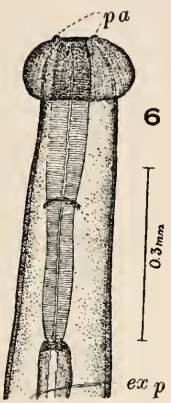
PLATE 2

PLATE 2

Fig. 6. *Cheiropteronema globocephala*, anterior extremity of male.
Fig. 7. *Cheiropteronema globocephala*, posterior extremity of male showing bursa, etc.
Fig. 8. *Cyrnea piaya*, posterior extremity of male.
Fig. 9. *Hadjelia coragypis*, posterior extremity of male.
Fig. 10. *Alœuris hirsutus*, posterior extremity of male, ventral view.
Fig. 11. *Alœuris hirsutus*, posterior extremity of male, lateral view.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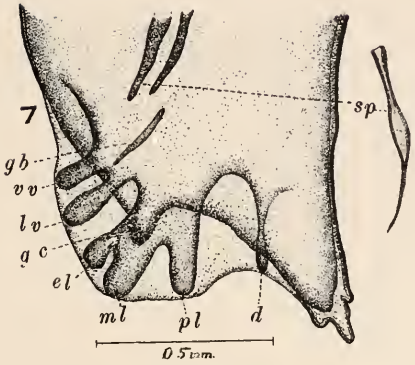
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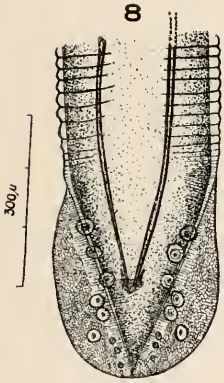
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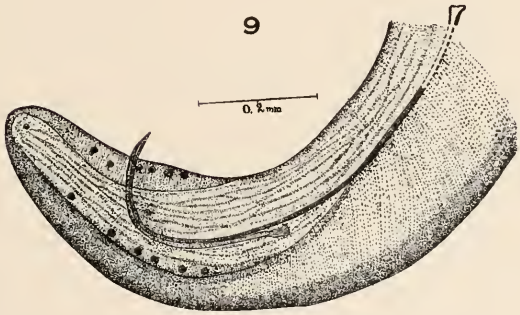
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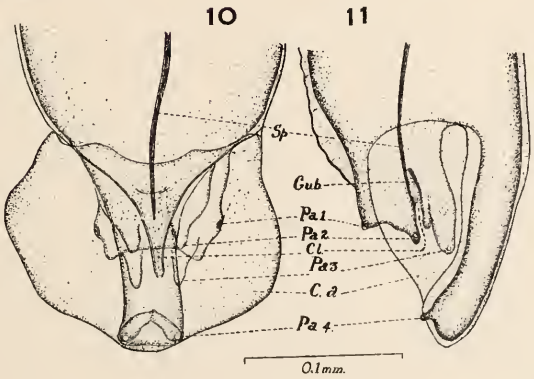
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Bulletin of the Museum of Comparative Zoölogy

AT HARVARD COLLEGE

VOL. LXIX. No. 15

A REPORT ON SOME CIRRIPEDS COLLECTED BY THE S. S. "ALBATROSS" IN THE EASTERN PACIFIC DURING 1891 AND 1904

BY RODERICK MACDONALD
(Carnegie Research Fellow)

WITH THREE PLATES.

CAMBRIDGE, MASS., U. S. A.:
PRINTED FOR THE MUSEUM
DECEMBER, 1929

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OF THE

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No. 15.—*A Report on Some Cirripeds Collected by the S.S. "Albatross" in the Eastern Pacific during 1891 and 1904*[1]

By Roderick Macdonald

The present collection was returned to the Museum of Comparative Zoölogy by Professor H. J. Hansen of Copenhagen, and kindly handed to me to report upon, by Dr. T. Barbour. The specimens, for the most part, are in a good state of preservation. I have included in this report a description of two new species of Cirripeds, *Scalpellum microceros*, and *Scalpellum pteryges*, which I found in the collection of this museum. All stations mentioned are "Albatross" dredging or towing stations, for list of which see C. H. Townsend, Report U. S. fish com., 1900 (1901), p. 387–562, and Alexander Agassiz, Mem. mus. comp. zool., **33**, 1906, p. 39–50.

Poecilasma kempferi (Darwin)

Plate **3**, figs. 1–11

Station 4654. Latitude 5° 46′ N., longitude 81° 31.9′ W. Bottom temperature 37.3° F. Depth at which trawl was used, 1036 fms. These specimens come closest to the subspecies *litum* Pilsbry. The valves are cream colored. There are five specimens having the following measurements:

	mm.	mm.	mm.	mm.	mm.
Length of capitulum	17	17	15	13	13
Breadth of capitulum	11	11	11	10	10
Diameter of capitulum	7	6	5.5	5	5
Length of peduncle	4	5	5	4	4

Station 3353. Latitude 7° 6′ 15″ N., longitude 80° 34′ W. Large beam trawl used at a depth of 695 fms. The nature of the bottom, green mud. The bottom temperature 39° F. There are nine specimens of *P. kempferi* which were found on *Parolonis aspera* (Faxon). The valves are white in color. In structure the valves resemble both *P. kempferi* and *P. aurantia* (Darwin). In internal structure I could find no difference between these specimens, also those found at Station

[1] Published from the accumulated principal of the Alexander Agassiz Fund by vote of the Museum Faculty, October 10, 1929.

4654, with that described for *P. kempferi* by Darwin (1851). The specimens from Station 3353 measure as follows:

	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Length of capitulum	14	13.5	10.5	9	9	8	8	6.5	5
Breadth of capitulum	7	7	5.5	4.5	5	4.5	4.5	4	3.5
Diameter of capitulum	3.5	3.5	5.5	2	2	2	2	1.5	1.5
Length of peduncle	4	4	2.5	2	2	2	2	1	1

Apparently *Poecilasma kempferi* is subject to considerable variation in structure of valves. Gruvel (1920) says, "Dans ma Monographie des Cirripèdes, j'ai réuni sous le même nom les deux espèces de Darwin: *Poecilasma kempferi* et *P. aurantia*, en faisant, simplement de cette dernière, une variété de la première, ne trouvant pas les caractères distinctifs suffisants. Je reste sur cette impression après l'étude des exemplaires de cette collection." Nilsson-Cantell (1927) says of *P. kempferi*: "The specimens from Tasmania seemed as regards external parts to agree with several of the classified subspecies." Although the specimens found at Station 4654 are different in color and relative size of valves from the specimens found at Station 3353, the general form and structure of the valves in all the specimens exhibit features which relate them to *P. kempferi* and *litum* on the one hand and *P. kempferi* and *P. aurantia* on the other.

Verruca costata (C. W. Aurivillius)

Station 3357. Latitude 6° 35′ N., longitude 81° 44′ W. Depth 782 fms. Bottom composed of green sand. Bottom temperature 38.5° F. Two groups of specimens attached to spicules of an Hexactinellid.

Station 4631. Latitude 6° 26′ N., longitude 81° 49′ W. Depth 774 fms. Bottom temperature 38° F. Bottom composed of green sand. Two groups of specimens attached to spines of an Echinoderm.

Lepas hilli (Leach)

Station 3399. Latitude 1° 7′ N., longitude 81° 4′ W. There is a cluster of about two dozen well-grown specimens which were found attached to a turtle.

LEPAS DENTICULATA A. Gruvel 1900

Plate **1**, fig. 9. Plate **3**, figs. 12 and 13

Station 4587. Latitude 20° 42′ N., longitude 107° 25′ W. 82° F. surface. Twenty-eight miles from land.

Station 4596. Latitude 16° 47′ N., longitude 100° 27′ W. 84° F. surface. One hundred and forty-four miles from land.

This species was first identified by Gruvel and, owing to scarcity of material, incompletely described. In the present collection I have been able to find an almost complete series of the stages from the fixed pupa to the adult barnacle. A detailed description follows.

Capitulum slightly elongated relative to its breadth. Valves are white and five in number, and closely approximated to one another. They are distinctly furrowed. The laying down of Ca is more rapid in the terga than in any other of the valves. Calcification of the valves begins in specimens with the capitulum .75 mm. long. The terga are the first valves to be calcified, then follows the calcification of the carina and finally the scuta. The peduncle is yellow to colorless in young and dark brown in older specimens. The peduncle becomes smaller in proportion to the size of the capitulum as the animal increases in size.

Capitulum	*Peduncle*
1.0 mm.	1.25 mm.
1.5	1.5
2.0	1.0
3.0	1.5
4.5	2.5
7.0	3.0

Scutum. Occludent margin rounded and protuberant. There is a wide space between occludent margin and ridge which runs from umbo to apex. There is a strong internal umbonal tooth on the left valve. No tooth is present on the right valve. On both valves there is a thick basal ridge not extending quite to the carino-basal angle. In the right valve a short ridge runs from the umbo to the occludent margin with which it makes a narrow groove. The occludent margin is curved outwards in this region and this, in addition to the fact that the basal ridge projects beyond the occludent margin, makes the above-mentioned groove pronounced. The basal margin is sinuous. The surface bears many small tubercles.

Tergum. Approximately triangular, with the umbo flattened. The basal angle is pointed. A prominent tubercle is present on the internal

surface on or near the scutal margin almost opposite the umbo. In young specimens the tubercle can be seen from the external side projecting slightly beyond the scutal margin. As growth proceeds the tubercle increases in size and moves inwards from the margin, disappearing from external view when the capitulum is about 4 mm. long.

Carina is barbed. In young specimens the barbs are relatively large and vary in number from seven to ten. In older specimens the large barbs decrease in number, usually four situated widely apart, with a number of smaller barbs between them. The general surface of the carina is covered with small tubercles. The base is forked. In young specimens, about 1 mm., the outer edge of each branch of the fork has, at its outer edge, a comparatively large curved denticle. In older specimens the denticles disappear.

Filamentary appendages. In the full grown adult there are five, four arise below the basal articulation of the first cirrus, and one on the prosoma. The filamentary appendages make their first appearance when the animal has a capitulum of 1–5 mm. In specimens of that size the proximal appendage is a large bud. When the capitulum is 3 mm. long the proximal and upper posterior appendages are well-grown filaments; the remaining three filaments are present as buds, of these the lower anterior is the largest. In animals with a capitulum 4 mm. long all the filaments are present fully grown. That in the prosoma and the upper anterior filament are much longer than the others. The lower filaments are bordered with a purple colored margin. The specimens are preserved in alcohol.

Concerning the filamentary appendages Gruvel remarks, "Je n'ai pas trouvé d'appendices filamenteux, mais je ne saurais affirmer qu'il n'en existe pas, car je n'ai eu qu'un seul echantillon à ma disposition, et encore en mauvais état de conservation, le flacon qui le contenait avant été privé d'alcool quelque temps." [1]

Mandible (Plate 1, fig. 9). There are five strongly built teeth. The first tooth is much larger than and far removed from the others. The lower angle is prominent and as suggested by Gruvel may be considered virtually to be another tooth. Thus there are altogether six teeth. The anterior side of the lowermost tooth is armed with four or five denticles. The mandible is for the most part covered with small fine hairs.

Caudal appendages very small, simple, hook-shaped, and about half the length of the first segment of the sixth cirrus.

[1] Bull. mus. d'histoire naturelle, Année 1900, no. 5, p. 241–242. Sur une espèce nouvelle du genre Lepas Linné par A. Gruvel. Also Monographie des Cirrhipèdes ou Thecostraces par A. Gruvel, p. 106–107.

Scalpellum microceros, spec. nov.

Plate 2, fig. 1

Type locality.—Latitude 13° 52′ N., longitude 61° 7′ W. Off St. Lucia. Depth 278 fms.

Capitulum trapezoidal. There are fourteen well-calcified, white valves in close contact, and covered with a thin cuticle. The surfaces of the valves have fine striae.

Scutum about twice as long as broad. Surface strongly convex. The umbo is apical. The occludent and lateral margins are subparallel.

Tergum is one and a half times as long as scutum and somewhat lanceolate. Occludent margin straight. Carinal and scutal margins convex.

Carina is arched, with an acute apical umbo which intrudes between the terga. The roof is flat and bordered with prominent rounded ridges. The sides are broad, being of equal breadth practically throughout their length. The surface is covered with fine radial and longitudinal striations. The basal margin is almost straight.

Upper latus pentagonal. The carinal and scutal margins are almost parallel. Two parallel shallow grooves run alongside the scutal margin. The lower half of the scutal margin overlaps the scutum. A low ridge runs along the tergal margin.

Rostral latus linear, about seven times as long as broad, with a shallow groove running the length of the surface. The latus stands out prominently above the surface of the scutum.

Rostrum is very small, and triangular; about one quarter of the size of the inframedian latus. It overlaps the apices of the rostral latera.

Inframedian latus is very small, triangular with the apex curved toward the occludent border. The umbo is apical and a low ridge runs down each side.

Carinal latus triangular. The apical half projects upward and considerably beyond the carina. The specimen is slightly damaged but there are indications that the apex flares out slightly. The roof of the carina extends between the carinal latera to the peduncle.

The peduncle is equal in length to the capitulum and covered with imbricated scales in about twenty-eight rows.

The capitulum is 31 mm. long and 23 mm. broad.

This handsome species resembles closely, and is obviously related to the group of *Scalpellum arietinum* (Pilsbry) 1907 (a). It differs from the members of this group by the structure of the carina, the carinal latus and the rostral latus. The peduncle is also relatively much longer

in the species now described. The inframedian latus which has a distinctive shape is similar to that found in *S. dicertum* (Pilsbry). There is only one specimen which, though it has been lying in a dry condition for fifty years, is in a remarkably good state of preservation.

Scalpellum pteryges, spec. nov.

Plate 2, fig. 4

Type locality.— Latitude 13° 52′ N., longitude 67° 7′ W. Off St. Lucia. Depth 278 fms. Specimen was found attached to cable by Capt. Cole while on S. S. "Enterprise."

Capitulum has the same general shape as *S. microceros*. The occludent margin is approximately straight. It is for the most part cream-colored, with the region of the apices of the fourteen valves rose-tinted. The valves which have a smooth finely striated surface are in close contact with one another, the chitinous sutures being very narrow.

Scutum is similar in shape to *S. microceros*. A prominent ridge runs from the apex to the basal lateral angle.

Tergum also like that of *S. microceros*.

Carina pronouncedly arched and, as in *S. microceros*, the acute, apical umbo intrudes between the terga. The roof is slightly convex, and bordered with very low rounded ridges. The sides are moderately wide, tapering towards the apex, and having a shallow sulcus running along their entire length. The basal margin is deeply rounded.

Upper latus pentagonal, with the scutal margin longest, the tergal, carinal, basal, and that bordering on the inframedian latus successively shorter. The umbo is acute and apical. A low ridge runs from the apex to the carinal-basal angle.

Rostral latus slightly raised above the scutum. The length of the valve is three times as long as wide. The upper and lower margins are parallel. The apex is beaked and a ridge runs from the apex to the basal-lateral angle.

Rostrum triangular, very small, and the apex projecting outward from between the apices of the rostral latera.

Inframedian latus triangular, higher than wide, with margins slightly raised and apex slightly curved toward the occludent border.

Carinal latus somewhat triangular, with the base in two parts: a longer upper lateral margin, and a shorter margin bearing on the inframedian latus. The apical portion projects beyond the carina, and is considerably curved downward, the apex itself being very acute. The

wing-like latera, viewed dorsally, show the carina extending between them almost to the peduncle. Towards the apex the latera appear twisted outward.

The peduncle has about thirteen rows of scales and is 10 mm. long.

The capitulum is 23 mm. long, and 15 mm. broad.

Scalpellum bigelovii, spec. nov.

Plate 2, fig. 2

Type locality.— Station 3380. Off Panama. Latitude 4° 3′ N., longitude 81° 31′ W. Depth 899 fms. Temperature 37.2° F. Found attached to the skeleton of a sponge on a rocky bottom.

Capitulum about one and a third times as long as broad. There are thirteen incomplete well-calcified valves with their surfaces delicately marked. The valves are covered with a thin cuticle, and joined by wide and thick, chitinous sutures. The summit is slightly obtuse and the dorsal outline is convex.

Scutum is triangular, approximately three times as long as wide. The apex has a short tergal branch. The occludent margin is distinctly convex at its upper end. The lateral margin is straight; the basal margin is straight and oblique. The umbo is apical.

Tergum is V-shaped, with the carinal branch one and a half times as long and more convex than its neighbor. The apex is recurved. There is a chitinous swelling along the occludent border. The occludent branch is grooved along the outer side. There is a ridge along the surface of the carinal branch.

Carina is widely separated from the other plates by very thick chitinous sutures. It is abruptly bent at the umbo, which is a considerable distance from the apex of the tergum. The sides are wide near the umbo but taper off rapidly towards the lower end and also towards the apex which is very close to the apex of the tergum. The roof is slightly convex and ridges are absent. The base is straight.

Upper lateral plate is widely separated from the other valves. The umbo has approximately a median position. The lower part of the valve is roughly triangular, and the upper part ovate.

Carinal latus is horn shaped, with the carinal margin strongly concave, and the lateral margin convex. The basal margin is oblique and nearly straight. The umbo is apical. The apex projects considerably beyond the carina.

Rostral latus is crescent shaped. The scutal margin is slightly, and

the basal margin more pronouncedly convex. Both of these margins are involuted, forming a groove along the surface of the valve. The umbo is at the upper front angle.

Rostrum is absent.

Inframedian latus is almost linear and widest at the extreme lower end, where we find the umbo. The surface is broader at the upper end and narrows toward the umbo. The sides are concave.

Length of capitulum 25 mm., and breadth 18 mm. Length of peduncle 8 mm.

There is only a single specimen of this species in the collection. It belongs to the section Neoscalpellum (Pilsbry) 1907 (a) and appears to be intermediate between *S. imperfectum* and *S. sanctaebarbarae*. It combines the projecting umbo of the carina characteristic of the former with the reduced size of the lower whorl of plates which distinguishes the latter. The carinal latus projects farther beyond the carina, and is much more elongated in *S. bigelovii* than in *S. imperfectum*. The plates are wider apart and less developed in *S. bigelovii* than in *S. imperfectum* or *S. sanctaebarbarae*.

Scalpellum meropleura, spec. nov.

Plate 1, figs. 7–8

Type locality.— Station 3381. Latitude 4° 56′ N., longitude 80° 52′ 30″ W. Depth 1772 fms. On a bottom of green mud. The bottom temperature was 35.8° F. The specimens, three in number, are each attached to an Echinoderm spine, probably Cidaris sp.

Capitulum is somewhat oval, widest towards the middle dorsal border, more curved than the ventral border. Valves are fourteen in number. They are thin and brittle and are separated from one another by narrow chitinous spaces. All the plates show faint radial striations.

Scutum is large and quadrilateral. Occludent margin is straight, except at the apex, where it is slightly convex. The lateral margin is curved and hollowed out at the superior extremity. The tergal margin is almost straight, and the umbo projects slightly over the tergum. Basal margin convex.

Tergum is triangular; broader and longer than the scutum. Occludent and scutal margins almost straight. The carinal margin slightly concave. The apex has been slightly eroded during storage of specimens.

Carina is long, with a flat roof bordered by prominent and rounded ridges. The sides are fairly wide, being widest at the apex. The base is concave.

Upper latus is about as broad as the scuta and about twice as long as broad. The tergal and carinal margins are straight. Scutal margin consists of two parts: a larger and concave one separating it from the carinal latus, and a much smaller and straight one against which the inframedian latus is placed. The umbo is not terminal.

Rostrum is present in one specimen in the shape of a narrow pin head structure. It is absent in the other specimens. Whether or not it has been dissolved during storage in alcohol I have been unable to determine.

Rostral latus is quadrangular, and not so high as wide. The basal margin is shorter than the scutal margin. Rostral and lateral margins are straight, and slightly diverging. A ridge runs from the apex to the basal margin, dividing the face of the valve into two parts: an upper which is concave and a lower which has several riblets.

Inframedian latus. Rectangular and narrow, with the umbo in the upper third. The lower end is appreciably wider than the remainder of the valve.

Carinal latus is somewhat longer than broad and projects slightly beyond the carina. The lateral margin is in two parts: the upper part which is somewhat sinuous runs alongside the margin of the upper latus, while the other part is slightly convex and runs alongside the inframedian latus. The carinal margin is almost straight and subparallel with the lower part of the lateral margin. A low ridge also runs from the apex to the basal inframedian angle. The lower triangular face of the valve which is thus demarcated is ribbed. In dorsal view each carinal latus bears three or four strong ribs; they meet one another in an irregular suture where the ribs of each valve interlock.

Mandible (Plate **1**, fig. 8) has three strong teeth. The upper side of the third tooth bears seven or eight small spines. The lower angle bears six small spines.

Caudal appendage (Plate **1**, fig. 7) has six segments. The two distal segments are long. The proximal end of the penultimate segment almost reaches the distal end of the second segment of the sixth cirrus.

This species resembles closely *S. semisculptum* and *S. aurivillii.* The carinal latus resembles *S. semisculptum* in shape and *S. aurivillii* in sculpturing. The carinal margin of the upper latus in *S. semisculptum* and *S. aurivillii* is much shorter than in the present species. The occludent margin of the tergum in the above-mentioned species is pro-

nouncedly convex, whereas in the species now described it is for the most part straight.

The sizes of the three specimens are as follows:

Capitulum		*Peduncle*
Length	Breadth	Length
12.5 mm.	7.0 mm.	3.0 mm.
13.5	7.25	3.5
15.0	8.0	4.0

Scalpellum proximum (Pilsbry)

Plate **1**, figs. 1, 2, 3. Plate **2**, fig. 5

Station 3392. Latitude 7° 5′ 30″, longitude 79° 40′. Depth 1270 fms. Hard bottom. Bottom temperature 36.8° F. There are seven specimens present in the collection and all show some differences from Pilsbry's 1906 description of the species. These differences I suggest are not of specific significance. In the present specimens the ridge running from the umbo to the basal margin in the rostral latus and carinal latus is prominent and the surface of these valves is concave. A pin head rostrum is present.

The sizes of the specimens are:

Capitulum		*Peduncle*	
Length	Breadth	Length	
9.0 mm.	4.5 mm.	3.0 mm.	
8.0	4.0	2.5	(3 specimens)
6.5	3.25	2.0	
6.0	3.0	2.0	
6.0	2.5	1.5	

Mandible has four strong teeth whose apices are approximately equidistant from those of its immediate neighbors. The lower angle is pointed and bears six small spines.

Maxilla has two strong and two smaller spines at the upper angle. There is a distinct pointed notch separating the upper group of spines just mentioned from the lower group of spines, which latter are intermediate in size. The lower third bears short, stiff bristles.

Caudal appendage has five segments. The distal segment of the caudal appendage does not quite reach the distal end of the second segment of the sixth cirrus.

Scalpellum perlongum (Pilsbry)

Plate **1**, figs. 4, 5, 6; Plate **2**, fig. 6

Station 3392. There are five specimens present. They agree in all respects with Pilsbry's (1906) description, except that in the present individuals a pin head rostrum is present. The sizes of the specimens are as follows:

Capitulum		*Peduncle*	
Length	Breadth	Length	
5.0 mm.	2.25 mm.	1.5 mm.	
4.75	2.0	1.5	(2 specimens)
5.5	2.5	1.5	
4.0	1.75	1.0	

Mandible has three teeth, the apex of the first being twice as far removed from that of the second as the apex of the second tooth is from that of the third. There are three or four small spines on the upper edge of the third tooth. The lower angle is somewhat pointed and bears six or seven small spines.

Maxilla has two strong and one small spine at the upper angle. As in *S. proximum* there is a small notch separating the lower group from the upper group of spines. There are at least five moderately large and three smaller spines in the lower group. The lower angle bears several hairs.

Caudal appendage has six segments, with the last segment stretching slightly beyond the second segment of the sixth cirrus.

Scalpellum imperfectum (Pilsbry) 1907 (a)

Plate **2**, fig. 3

Station 3400. Off Galapagos Islands. Latitude 36° 00′ S., longitude 86° 46′ W. Bottom temperature 36.1° F. 1322 fms. Light globigerinous ooze. Found on an echinoderm spine.

There is only one specimen in the collection.

Length of capitulum 23 mm., breadth 15 mm.

Length of peduncle 9 mm.

The following species was identified by Professor H. J. Hansen of Copenhagen before the collection was handed over to me.

Chelonobia testudinaria (Linné)

Station 3364. Latitude 5° 30′ N., longitude 86° 8′ 30″ W.

There is one specimen measuring 23 mm. in greatest diameter, taken

from the back of a turtle. There are also two cypris stages of *C. testudinaria* and some very small specimens of *Conchoderma virgatum* variety *chelophilum* (Leach).

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EXPLANATION OF PLATES

PLATE 1

PLATE 1

Fig. 1. Mandible of adult *Scalpellum proximum* (Pilsbry). × 100.
Fig. 2. Maxilla of above. × 100.
Fig. 3. Sixth cirrus with caudal appendage of above. × 82.5.
Fig. 4. Sixth cirrus with caudal appendage of adult *Scalpellum perlongum* (Pilsbry). × 75.
Fig. 5. Mandible of 4. × 75.
Fig. 6. Maxilla of 4. × 100.
Fig. 7. Sixth cirrus with caudal appendage of adult *Scalpellum meropleura*. × 75.
Fig. 8. Mandible of adult *Scalpellum meropleura*. × 100.
Fig. 9. Mandible of adult specimen of *Lepas denticulata* Gruvel. × 100.

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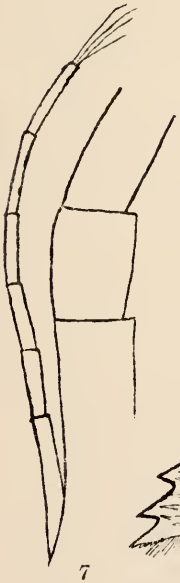
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PLATE 2

PLATE 2

Fig. 1. *Scalpellum micrococros*, lateral view. Natural size.
Fig. 2. *Scalpellum bigelovii*, lateral view. Natural size.
Fig. 3. *Scalpellum imperfectum* (Pilsbry), lateral view. Natural size.
Fig. 4. *Scalpellum pteryges*, lateral view. Natural size.
Fig. 5. *Scalpellum proximum* (Pilsbry), lateral view. × 2.
Fig. 6. *Scalpellum perlongum* (Pilsbry), lateral view. × 2.

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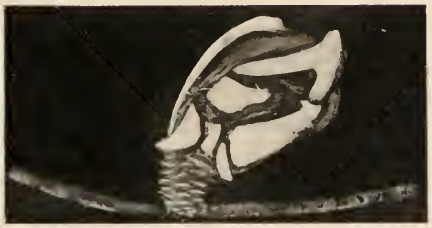

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PLATE 3

PLATE 3

Figs. 1–5. *Poecilasma kempferi* (Darwin), from Station 4654, lateral view. ×2.
Figs. 6–11. *Poecilasma kempferi* (Darwin), from Station 3353, lateral view. ×2.
Figs. 12 and 13. *Lepas denticulata* Gruvel, lateral view. × 4½.

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